

THE JOURNAL OF

THE INSTITUTION OF PRODUCTION ENGINEERS

Vol. 29, No. 10, October 1950

PUBLIC LIBRARY
OCT 27 1950
DETROIT



PUBLISHED BY THE INSTITUTION, 36 PORTMAN SQUARE
LONDON W.1
TELEPHONE WELBECK 6813/7

The RolaVeyor

**cuts costs . . .
boosts output**

NORMAN FOODS LTD., BIRKENHEAD, Food Manufacturers

"... a 50% saving in time of handling"

THOMAS & EVANS LTD., CARDIFF, Plant Bakers

"... a saving of 50% in man hours"

JOHN SOMERS & SONS (BRISTOL) LTD., Packing Case Makers

"... reduced overhead costs and stepped up our output"



Write for full particulars of The RolaVeyor, the improved gravity roller conveyor made in five different loading capacities. It can assist you in a similar manner.

J. Collis & Sons, Ltd.,
Dept. E.18.
42-44 Regent Square, W.C.1.
Terminus 614.

**Makers of
THE COLLIS TRUCK**

J Collis & Sons, Ltd

THE NAME THAT CARRIES WEIGHT

1

.

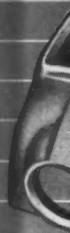
t

ng''

irs''

ut''

T



"the

"In prod

we must be

for, as you

finished ins

It seems

aluminium

contributing

Cameras wh

We are

research and

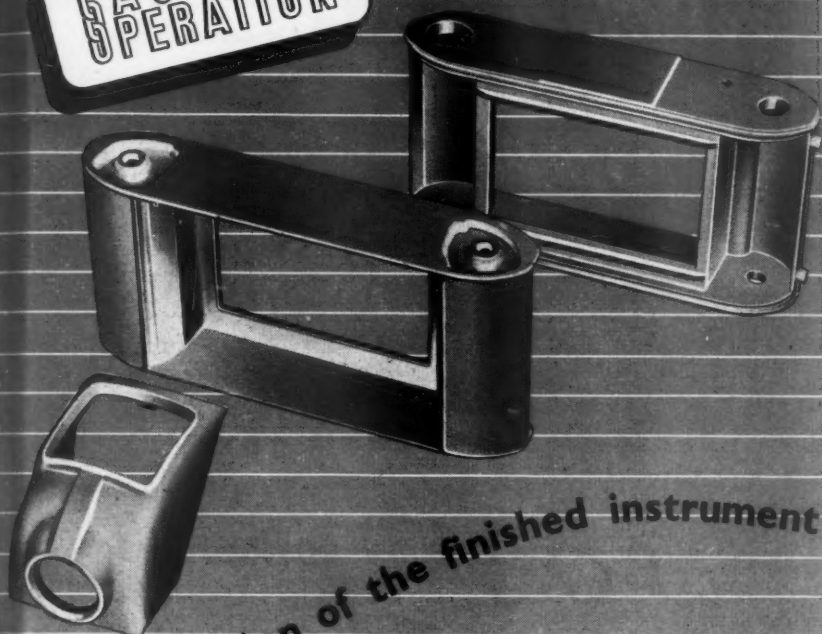
been able to

believe, refle

Know

THE
BIRA

**CASTING
OPERATION**



"the foundation of the finished instrument"

"In producing a camera of the highest precision we must be able to depend on a good body casting for, as you are aware, it is the foundation of the finished instrument."

It seems beyond doubt that the very satisfactory aluminium castings which you provide are contributing in no small way to the success of Ensign Cameras which are considered the finest of their kind."

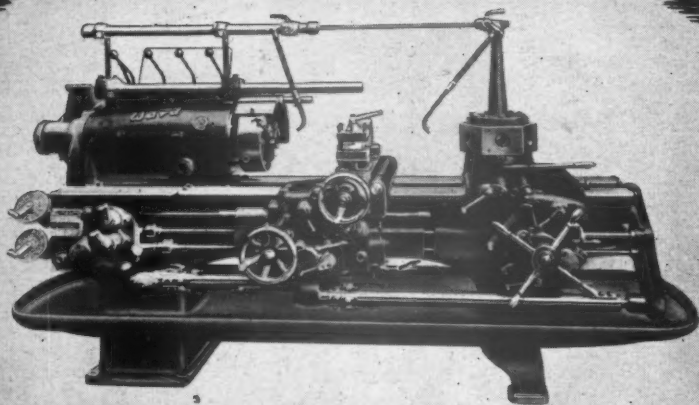
"We are greatly indebted to you for the research and development facilities which you have been able to place at our disposal and which, we believe, reflect in the fine quality of your castings."



Extract of letter from Brown Ensign Limited, London, E.15.

THE BIRMINGHAM ALUMINIUM CASTING (1903) CO. LTD.
BIRMID WORKS • SMETHWICK 40 • BIRMINGHAM

For Maximum Production



Ward

*Please write for
particulars of our
full range of
Capstan & Turret
Lathes*

No. 7 COMBINATION TURRET LATHE

Capacity: 2½ in. dia. hole through spindle.
16 in. dia. swing over stainless
steel bed covers.

Spindle: Mounted in ball and roller
bearings.

Powerful metal-to-metal cone clutches
transmit power through ground
gears.

Ward machines are designed and built
to get the best out of tungsten carbide,
their metal removing capacity being
limited only by the cutting tools used.

H.W. WARD & CO. LTD

SELY OAK
TELEPHONE



BIRMINGHAM 29
SELY OAK 1131

LANG
LATHES

WHERE
THERE ARE LANGS
THERE IS ALSO THE INTENTION
TO HAVE MORE LANGS AS
SOON AS NEW LATHES ARE NEEDED

13" swing 'JUNIOR' Sliding,
Surfacing and Screwcutting
Lathe.

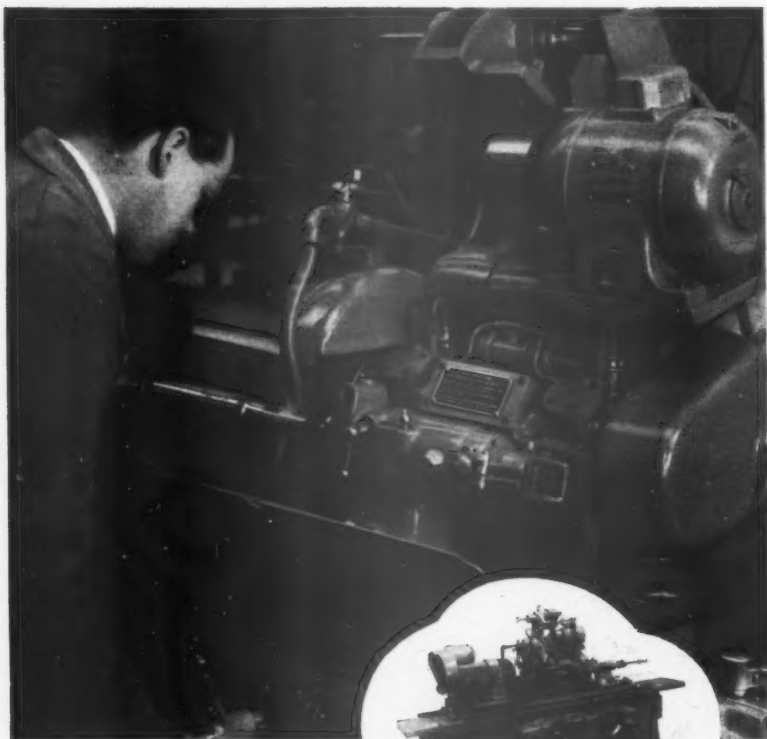
12 speeds in two ranges of
6 each; nickel chrome gears;
multi-plate friction clutches;
preloaded spherical roller
bearing to spindle.

17" swing also available.

Write for descriptive leaflets.

JOHN LANG & SONS LTD
JOHNSTONE • NEAR • GLASGOW
Phone: JOHNSTONE 400.

LONDON OFFICE
ASSOCIATED BRITISH
MACHINE TOOL MAKERS LTD
17 Grosvenor Gardens S.W.1



Churchill

Churchill machines have set a very high standard for Universal Grinding Machines due to their simplicity, combined with versatility and general efficiency in operation on a large variety of work.

THE CHURCHILL MACHINE TOOL COMPANY LIMITED, Broadheath, Nr. Manchester.
Export Sales Organisation :- Associated British Machine Tool Makers Ltd., London, Branches and Agents.
Home Selling Agents :- Charles Churchill & Co., Ltd., Birmingham and Branches.



UNIVERSAL GRINDING MACHINES

Unique



"Newallastic" bolts and studs have qualities which are absolutely unique. They have been tested by every known device, and have been proved to be stronger and more resistant to fatigue than bolts or studs made by the usual method.

G. P. Newall & Co., Ltd.

POSSIL PARK GLASGOW • N

and NOW
**the JUNIOR
HYDRACLAMP**



**HOLD A JOB
UP TO 15lb.—**

*for welding, soldering, assembling,
polishing, repair etc.*

**—JUST WHERE
YOU WANT IT!**

"Hydraclamp" it at ANY angle

Write or Telephone for Fully Illustrated Leaflet

SPENCER, FRANKLIN LIMITED

292 HIGH HOLBORN, LONDON, W.C.1

Telephone: HOLBORN 1436 (3 lines)

DEPOSITION FACILITIES AT



The plant is equipped to treat components between the extremes illustrated.

Executives are invited to write for fully descriptive leaflet P.E.5.

Illustrated in the background is a 3,000-ton Schloemann Forging Press, the property of Messrs. High Duty Alloys Ltd., Forging Division, Redditch, for whom we deposited the 8ft. 6in. main rams and to whom we are indebted for permission to publish.






FESCOL LIMITED

Head Office & Main Works: LONDON, North Road, N.7

Northern Works: HUDDERSFIELD Cable Street

Scottish Works: PORT GLASGOW, Industrial Estate

A distributor drive shaft every 44 seconds —ty on a WICKMAN M

| | |
|---|--|
|  | NO. 1 STATION Rough turn front dia Countersink end. Rough form for 3 dias. and eccentric. |
|  | NO. 2 STATION Finish turn front dia. Turn remaining un- formed portion. Taper eccentric turn. |
|  | NO. 3 STATION Centre drill. Finish form 4 dias., chamfers, and under- cut |
|  | NO. 4 STATION Roll form spiral oil groove in front dia. |
|  | NO. 5 STATION Face and chamfer end. Skim turn front dia. Part off and break down form end of bar. |



These distributor drive shafts with 7 diameters, an eccentric turned taper, and oil groove rolled in during the operating cycle, are coming off the Wickman automatic at the rate of over 70 an hour—typical Wickman production.

The wide range of attachments which can be applied to Wickman automatics frequently eliminates successive machining operations, producing the completed part faster in a single cycle. When it's a question of exploiting automatic production the Wickman Engineering Department can usually help. You may have just such a job as this which has never previously been considered for automatics, why

not send details to A. C. Wickman Ltd.

Remember too, all Wickman multi-spindle automatics incorporate the Wickman patent autotsetting mechanism whereby all tool feed strokes and bar feed can be set in 5 minutes or less, because there are NO cams to change.



A. C. Wickman
LIMITED

A. C. WICKMAN
LONDON · BRISTOL · BIRMINGHAM

ds -typical production N MULTI-SPINDLE AUTOMATIC



DISTRIBUTOR DRIVE SHAFT
PRODUCED COMPLETE
IN 44 SECONDS



NO
cams to
change

N LTD., COVENTRY, ENGLAND

AM MANCHESTER LEEDS GLASGOW NEWCASTLE BELFAST

LOW COSTS*depend largely on***ACCESSIBILITY****MAXIMATIC****AUTOMATIC MULTI-TOOL LATHES****DRUMMOND BROS. LTD**
GUILDFORD — ENGLAND*Sales and Service in the British Isles:***DRUMMOND-ASQUITH (SALES) LTD**
KING EDWARD HOUSE, NEW ST., BIRMINGHAM
Phone: Midland 3431-2-3 Grams: Maxishape B'ham*Also at LONDON & GLASGOW*

A feature of the MAXIMATIC LATHES is the provision for ready access to all adjustments and the ease with which the machine can be changed over for turning a new workpiece.

Full Particulars on Request.

Y

✦ 'HIGH TEST' Chain is available in the normalised or the hardened and tempered condition and in either state it develops an ultimate breaking load at least 50% above that of wrought iron chain, together with better elongation. It is available in the range $\frac{1}{4}$ " to $1\frac{1}{8}$ " dia. and is an exclusive product of the PARSONS CHAIN COMPANY LTD., STOURPORT-ON-SEVERN, WORCS.

✦ 'HIGH TEST' is the trade mark of the Parsons Chain Company Ltd.

TURN OVER TO
✦ **HIGH TEST**
CHAIN

Also available in PARSONS STAINLESS STEEL and MONEL CHAIN for acid conditions.

1

Yours faithfully

UNBRAKO

Economy in metal and space in the design of engineering plant and instruments, and the resultant saving in cost, the ease of assembly, minimised risk of damage in wrenching down, and lower maintenance costs, a tensile strength of up to 90 tons per sq. in.

All these points are vital to engineers and designers alike, and wherever socket head screws are used—from light precision instruments to heavy industrial equipment, and in the motor, aircraft, textile and an almost unlimited number of other industries—Unbrako High Tensile Screws give faithful service.



Manufactured by the **UNBRAKO SOCKET SCREW CO. LTD.**
BURNABY ROAD COVENTRY

Stocked and Distributed by **CHARLES CHURCHILL & CO. LTD.**
COVENTRY ROAD, SOUTH YARDLEY, BIRMINGHAM



Com

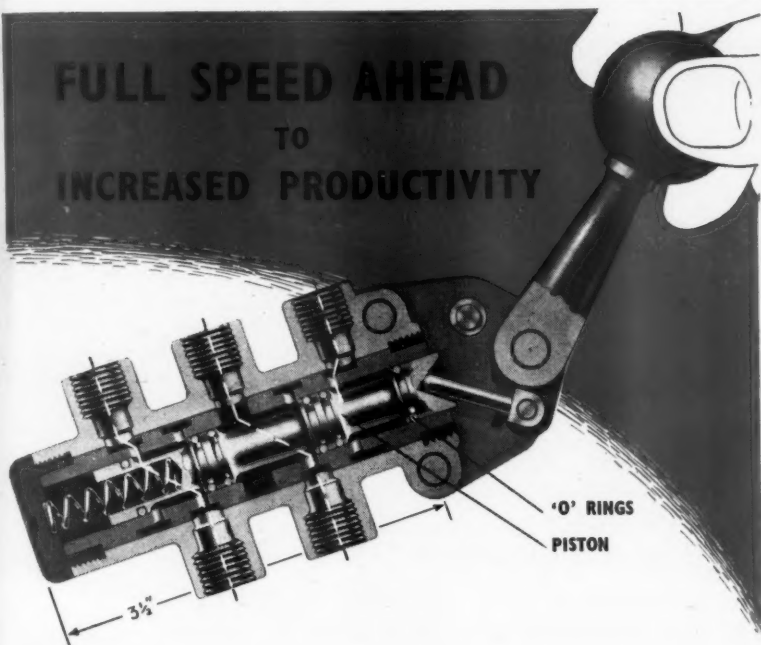
★ S
★ S
★ S
★ S

A M
con
acti
par
whi
mis

T
val
han

T H
CLIP

FULL SPEED AHEAD TO INCREASED PRODUCTIVITY



Compressed air power solves many problems—

- ★ **SIMPLIFIES** Jigs, fixtures and machines
- ★ **SPEEDS** . . . Loading and unloading
- ★ **SHORTENS** . . . Idle motions
- ★ **SAVES** TIME - MANPOWER - MONEY

A Maxam four-way valve. Small and compact, simple in construction and action. Nothing to go wrong. Note particularly the plastic 'O' rings, which make a perfect seal and minimise wear.

Two-way, three-way and four-way valves are available for operation by hand, foot, cam or solenoid; also

remote control valves, both pressure and pilot operated.

With standard Maxam valves and cylinders manual machines can be converted to automatic power operation; processes involving large thrusts and complex sequences can be designed to operate at the flick of a lever.

Let us send you full information.

VALVES AND CYLINDERS

MAXAM

AIR EQUIPMENT

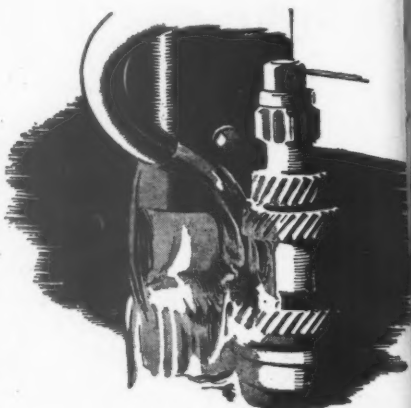
THE MODERN WAY TO FASTER PRODUCTION
CLIMAX ROCK DRILL & ENGINEERING WORKS LTD. 4 Broad Street Place, London, E.C.2

TAS/CX 495a

No teething troubles with this oil . . .

SWIFT is not cutting its first tooth—it did that several decades ago when straight cutting oils were more or less a novelty and engineers thought (incorrectly of course) that soluble oil was the panacea for all tooling troubles.

But machines, tools and materials need the latest improved SWIFT oils more than ever before. As working speeds increase and materials are toughened to withstand the service requirements of the 'Jet Age', so SWIFT oils are boosted in their formulation to protect the intricate form tools used today.



SWIFT oil is available in three grades, No. 3, No. 6 and No. 12, blended to suit specific requirements.

Our publication 'Cutting Fluids' tells you all about the different SWIFT oils. Send for a copy today!

NUMBER THREE • NUMBER SIX

SWIFT

NUMBER TWELVE AND BASE

Sulphurised Cutting Oil

FLETCHER MILLER LTD

HEAD OFFICE AND WORKS

HYDE • Nr. MANCHESTER • ENGLAND

SOUTHERN WORKS • SILVERDALE ROAD • HAYES • MIDDLESEX
MIDLAND WORKS • BILHAY STREET • WEST BROMWICH • S. STAFFS.

CF21

MACHINING TIME CUT *by*3 $\frac{1}{2}$ HRS.

report



Sonnerdale
Ltd.
of SYDNEY, AUSTRALIA

a large manufacturer specialising
in Gearing and Reduction Boxes

This impressive example of time saved on a difficult production run reported by Messrs. Sonnerdale Ltd of Stanmore, N.S.W., Australia, specialist machinists, is typical of results obtained with the "Matrix" No. 46 Thread Grinder, an outstanding product of Coventry Gauge un-rivalled experience in machine tool design. The complete range of "Matrix" Products includes special purpose Machine Tools, Measuring Instruments and Gauges of superlative quality in constant demand wherever the wisdom of using the best is appreciated.

Coventry Gauge
& TOOL CO. LTD. COVENTRY
GT. BRITAIN

in the MANUFACTURE OF THIS WORM

THE ability to slice 3½ hours off a 4 hour job is the sort of saving you need, leading to a rapid return of capital outlay. Why not put your production problems up to Coventry Gauge?

PRODUCTION DATA

| | | | | |
|-----------------------------|---|---|---|-----------|
| No. of Starts | - | - | - | Four L.H. |
| Pitch | - | - | - | 1.15625" |
| Lead | - | - | - | 4.625" |
| Helix Angle | - | - | - | 33° 22' |
| Addendum | - | - | - | .343" |
| Depth | - | - | - | .692" |
| Normal Thickness | - | - | - | .524" |
| Outside Dia. | - | - | - | 2.900" |
| Pitch Dia. | - | - | - | 2.213" |
| Root Dia. | - | - | - | 1.516" |
| Overall Length of Wormshaft | - | - | - | 12½" |
| Overall Length of Worm | - | - | - | 5½" |
| Previous Production Time | - | - | - | 4 hrs |
| Revised Production Time | - | - | - | 35 mins |
| Saving of 3½ hours. | | | | |



Sole Agents. WILLIAM ADAMS & Company Ltd. 175 Clarence St. Sydney, N.S.W.

The Council of the Institution

1950/51

President

Major-General K. C. Appleyard, C.B.E., T.D., D.L., J.P., M.I.Mech.E.,
A.M.I.Min.E., A.I.M.E.

Chairman of Council

Walter C. Puckey, F.I.I.A.

Vice-Chairman of Council

Harold Burke, M.I.Mech.E.

Past Presidents

Sir Alfred Herbert, K.B.E.
Dr. Herbert Schofield, C.B.E.

The Rt. Hon. Viscount Nuffield, G.B.E.
J. D. Scaife

Vice-Presidents

J. E. Blackshaw, M.B.E. T. Fraser, C.B.E. J. E. Hill E. W. Hancock, M.B.E.

Section Presidents

| | | | |
|--------------------------------|--------------------|-----------------------|----------------------------|
| H. Burke | <i>Birmingham</i> | R. L. Paice | <i>Luton</i> |
| Col. C. G. Warren-Boulton..... | <i>Bombay</i> | A. Fraser | <i>Manchester</i> |
| H. Gibson | <i>Calcutta</i> | W. M. B. Fowler..... | <i>Melbourne</i> |
| A. F. Pool..... | <i>Cornwall</i> | E. Paton | <i>New Zealand</i> |
| B. C. Harrison | <i>Coventry</i> | R. W. Mann | <i>N. Eastern</i> |
| A. R. Gow | <i>Dundee</i> | R. Cairns | <i>N. Ireland</i> |
| H. H. Dawson | <i>E. Counties</i> | G. H. Rippon | <i>Nottingham</i> |
| J. Wotherspoon | <i>Edinburgh</i> | A. J. Charnock | <i>Preston</i> |
| W. Buchanan, M.B.E. | <i>Glasgow</i> | L. R. Evans | <i>Sheffield</i> |
| I. G. Hopkinson | <i>Halifax</i> | C. A. Clarke | <i>Southern</i> |
| N. A. Cullin..... | <i>Leicester</i> | A. R. Northover | <i>S. Wales & Mon.</i> |
| J. R. Bergne-Coupland | <i>Lincoln</i> | E. G. Bishop..... | <i>Sydney</i> |
| F. Whitehead..... | <i>Liverpool</i> | R. S. Brown..... | <i>Western</i> |
| W. Core..... | <i>London</i> | H. Tomlinson | <i>Wolverhampton</i> |
| F. T. Nurrish, M.B.E. | | <i>Yorkshire</i> | |

Additional Section Representatives

| | | | |
|-------------------------|-------------------|-----------------------------|----------------------|
| F. Bernard White..... | <i>Birmingham</i> | M. Seaman..... | <i>Manchester</i> |
| F. C. White..... | <i>Birmingham</i> | J. F. Gibbons..... | <i>N. Eastern</i> |
| H. Eckersley | <i>Coventry</i> | J. H. Bingham | <i>Nottingham</i> |
| H. Gardner..... | <i>Glasgow</i> | H. Kirkman | <i>Preston</i> |
| J. Blakiston | <i>Halifax</i> | G. R. Pryor..... | <i>Sheffield</i> |
| H. W. Bowen, O.B.E..... | <i>London</i> | J. E. Attwood..... | <i>Western</i> |
| H. W. Townsend..... | <i>London</i> | W. J. Marshall | <i>Wolverhampton</i> |
| R. K. Allan | <i>Luton</i> | R. Beasley..... | <i>Wolverhampton</i> |
| F. W. Cranmer..... | <i>Manchester</i> | T. E. Phythian, M.B.E. | <i>Yorkshire</i> |

Chairmen of Standing Committees

J. E. Baty, E. P. Edwards, Sir Lionel Kearns, C.B.E., F. H. Perkins
The Rt. Hon. Lord Sempill, A.F.C., A. L. Stuchbery

Elected Members

A. J. Aiers, E. D. Broome, R. M. Buckle, J. E. Burnett, B. H. Dyson,
R. C. Fenton, H. G. Gregory, B. G. L. Jackman, E. J. H. Jones, M.B.E.,
R. Kirchner, Prof. T. U. Matthew, H. J. Swift, O.B.E.

Australian Sub-Council

1950

President

H. le Cheminant

Chairman

E. G. Bishop

Vice-Chairman

W. B. Fowler

Elected Members

| | |
|-----------------|------------------|
| F. Glover | C. Pullen |
| E. L. Offen | E. B. Richardson |
| E. C. Parkinson | J. M. Steer |
| J. E. Strick | |

South African Sub-Council

1949/50

President

A. C. Wotherspoon

Vice-President

J. Renwick

Past Presidents

| | |
|----------------|-----------------|
| A. B. Anderson | L. H. L. Badham |
| J. Henry | D. Lion-Cachet |

Elected Members

| | |
|----------------|--------------|
| R. H. Arbuckle | W. Caldwell |
| E. G. Fox | W. Gillespie |
| G. Godfrey | D. A. Petrie |
| W. Starr | D. R. Ryder |
| H. H. Waters | |

Education Officer: T. B. Worth

Acting Secretary of the Institution

W. F. S. Woodford

Section Honorary Secretaries

| | |
|---|--|
| Adelaide | |
| (South Australia) . . . | J. H. Law, 12, Fullerton Road, Netherbury. |
| Birmingham . . . | A. J. Mansell, 204, Alcester Road South, Birmingham, 14. |
| Bombay | E. H. Y. Burden, Machine Tools (India) Ltd., Imperial Chambers, Wilson Road, Ballard Estate, P.O. Box No. 522, Bombay, 1. |
| Calcutta | J. Warren-Boulton, Machine Tools (India) Ltd., Stephen House, Dalhousie Square, Calcutta. |
| Cornwall | F. W. Spencer, "Pembroke," Phillack, Hayle, Cornwall. |
| Coventry | A. Hill, 382, Ansty Road, Coventry. |
| Derby Sub-Section . . | A. Short, 9, Laburnum Grove, Kingsway, Derby. |
| Dundee | A. H. Webster, 8, Kinnordy Terrace, Craigiebank, Dundee, Angus. |
| Eastern Counties . . | L. A. Childs, Crane Ltd., Nacton Road, Ipswich. |
| Edinburgh | P. H. Lee, 39, Corstorphine Bank Drive, Edinburgh, 12. |
| Glasgow | H. M. Wylie, Alley & MacLellan, Ltd., Sentinel Works, Polmadie, Glasgow, S.2. |
| Halifax | Miss N. E. Bottom (acting), Hopkinsons, Ltd., Huddersfield. |
| Leicester and District | G. B. Ball, 'Haseldean', 344, Fosse Road North, Leicester. |
| Lincoln | E. E. Ingleton, "Glenroy," Lincoln Road, North Hykeham, Lincoln. |
| Liverpool | O. Blenkinsop, 119, North Barcombe Road, Childwall, Liverpool, 16. |
| London | R. Hutcheson, Machine Shop Magazine, Dorset House, Stamford Street, London, S.E.1. |
| Luton | R. M. Buckle, 238, Cutenhoe Road, Luton, Beds. |
| Manchester | R. S. Clark, 13, Fownhope Road, Ashton-on-Mersey, Sale, Cheshire. |
| Melbourne (Victoria, Australia) | C. Pullen, The Institution of Production Engineers, 3rd Floor, 18, Queen Street, Melbourne, C.1. |
| New Zealand | S. McL. Wallace, 21, Burwood Crescent, Remuera, Auckland. |
| North Eastern . . . | J. G. Nicod, "Fourwynds," 177, Victoria Road West, Hebburn, Durham. |
| Northern Ireland . . | W. G. Wyman, "Linden Lea," Cultra, Co. Down. |
| Nottingham | C. N. T. Manfull, Chellaston House, Thurgarton Street, Nottingham. |
| Preston | F. M. Kemp, Clayton, Goodfellow & Co., Ltd., Atlas Iron Works, Blackburn, Lancs. |
| Reading Sub-Section . | J. D. Smith, Schools of Technology and Commerce, Cowley Road, Oxford. |
| Rochester & District Sub-Section | W. G. Clements, 101, Featherby Road, Gillingham, Kent. |
| Sheffield | E. Levesley, The English Steel Corporation, Ltd., Vickers Works, Sheffield. |
| Shrewsbury Sub-Section | B. G. Williams, "Bryn Heulog," 38, Roselyn, Harlescott, Shrewsbury. |
| South Africa | The Secretaries, Institution of Production Engineers, Barclays Bank Buildings, Corner Commissioner and Harrison Streets, Johannesburg. |
| Southern | J. W. Taylor, 44, Deacon Road, Bitterne, Southampton. |
| S. Essex Sub-Section . | P. H. W. Everitt, 6, Hill Crest Road, Loughton, Essex. |
| South Wales & Mon. . | A. R. Cason, 28, Heol Powys, Ton-yr-ywen, Birchgrove, Cardiff. |
| Sydney (N.S. Wales) . | J. M. Steer, G.P.O. Box 1665, Sydney. |
| Western | A. Eustace, 19, Ferndale Road, Northville, Bristol, 7. |
| West Wales Sub-Section . . | H. P. Sanderson, I.C.I. Ltd., (Metals Division) Waunarlwydd, near Swansea. |
| Wolverhampton . . . | W. J. Marshall, Moston Park, Lee Brockhurst, Salop. |
| Yorkshire | J. L. Townsend, 26, Moor Allerton Drive, Street Lane Leeds, 7. |

Graduate Section Honorary Secretaries

| | |
|--------------------------|--|
| Birmingham . . . | J. Irwin, 132, Grestone Avenue, Handsworth Wood, Birmingham, 20. |
| Coventry | D. Graham, 14, Edmund Road, Coventry. |
| Halifax | E. G. Harrison, 124, Birkley Hall Road, Huddersfield. |
| Liverpool | E. A. Hewitt, 4, Olive Mount, Liverpool, 15. |
| London | R. T. Mustard, 47, King's Road, Woodham, Weybridge, Surrey. |
| Luton | C. S. Brewer, 144, Hart Lane, Luton, Beds. |
| Manchester . . . | G. H. Armes, 14, Fairmile Drive, East Didsbury, Manchester, 20. |
| North Eastern . . | G. D. Robson, 86, Dryden Road, Low Fell, Gateshead. |
| Wolverhampton . . | R. W. Tomkys, 30, Church Road, Bradmore, Wolverhampton, Staffs. |
| Yorkshire | J. Freel, 27, Roundhay Grove, Leeds, 8. |

THE JOURNAL OF

THE INSTITUTION OF PRODUCTION ENGINEERS

Vol. 29, No. 10, October 1950



Contents

| | |
|--|---------|
| Working Groups—Service to the Institution | 419 |
| Opening of Hazleton Memorial Library | 425 |
| Institution Notes | 426 |
| Meeting of Council | 426 |
| National Defence | 426 |
| Joint Committee on Measurement of Productivity | 426 |
| Work Measurement Research Survey | 426 |
| Section Activities | 427 |
| Working Groups—Progress Report | 428 |
| News of Members | 430 |
| British Standards | 432 |
| Books Received | 432 |
| Section Meetings | 434 |
| “The Future of Production Engineering” | |
| by C. R. Whitaker, M.I.Prod.E. | 438 |
| Index to Advertisers | LXXXIII |

The Institution of Production Engineers does not accept responsibility for any statements made or opinions expressed in any papers published in the Journal of the Institution.

Published by THE INSTITUTION

36, PORTMAN SQUARE, LONDON, W.1

Price 5/-

Telephone: WELbeck 6813/7

WORKING GROUPS

Service to the Institution

THE vitality of any corporate body can only be the sum total of the personal contributions made by its individual members. A comparatively small body can carry immense weight in national affairs if all its members are active and take a vigorous part in its corporate life : conversely, very large bodies whose members are apathetic quickly sink into insignificance. This is a lesson to be learned from the fortunes of nations in the course of history. Moreover, the standing of a professional body in the eyes of the community will always rest largely on the quality and extent of the public service rendered by its members, and their contribution to social progress.

The Institution of Production Engineers, by virtue of the characteristics of the profession it serves, should be amongst the most progressive of such bodies, and its very rapid growth in numbers and status over the last ten years might be held to justify this claim. However, there is a serious danger that with such rapid growth, the main body of members may lose touch with its policy and activities, and thus its very growth may be a source of weakness. For this reason, Council have lately been giving serious thought to ways in which the individual member can be enabled to maintain close contact with the Institution and make a personal contribution to its corporate life.

OPPORTUNITIES OF SERVICE

In the past, active work on behalf of the Institution has been confined to a minority of members who by their invaluable voluntary service as Section Hon. Secretaries, as members of Section Committees and Standing Committees, and finally as members of Council, have shouldered the main burden of responsibility.

On the other hand, there are a number of ways in which other members can contribute, and their individual contributions, even if apparently small, will be of great value when properly co-ordinated. By undertaking a specific task on behalf of the Institution, members can help to share the load more fairly.

SCOPE FOR VOLUNTARY WORK

One of the principal ways in which individual members can help is by pooling their personal knowledge and experience as members of Study Groups doing practical research work in the field. The resources latent in the Institution membership have scarcely yet been tapped ; it is essential that this experience should be available in a constant

stream for the benefit of the profession and the community as a whole. Members are known to be employed in every kind of industrial enterprise, distributed over the whole of the British Isles and a large part of the British Commonwealth. These members have access through their daily activities to a mass of factual knowledge, which may be of great value to the Institution if intelligently applied to a common purpose.

OBJECTIVES OF STUDY GROUPS

The main objective of study groups or working groups should be to produce factual evidence, in the form of case studies, to form the basis of any Reports which the Institution may subsequently publish on research or educational subjects. By virtue of its professional status, the Institution is in a favourable position to publish information about industrial progress, with a view to improving productivity. No such Report would be of any value if it consisted only of opinions and generalisations, which are open to immediate challenge. Such documents must be based on facts which, being furnished from the direct manufacturing experience of members of the Institution, would be unchallengeable.

It is for this reason that Council asks Working Groups to make the best possible use of the experience of their members, and to produce case studies illustrating their field of study. Apart from the value of these studies to the Research Committee, the pooling of experience in this way will be of immense benefit not only to the members of the Group, but to Production Engineers throughout the country who may have encountered similar problems in their own works. This sharing of experience is surely one of the reasons for the existence of the Institution. These remarks apply particularly to the Working Groups on Materials Handling, whose aim will be to provide a comprehensive picture of the general practice in British industry with regard to the application of materials handling methods. Members will have access through their daily activities to factual information which, if properly used, can be of the greatest value in building up this overall picture. They might re-examine their own solutions of particular handling problems within their own works, and consider whether this past experience would provide material for a case study. Naturally, the most useful studies will be those not concerned with isolated and infrequent problems, but those which have a wide application and illustrate a principle. Cases where changes of practice were *not* justified by results may also be valuable, if they contribute to our knowledge of the circumstances in which various categories of materials handling equipment can economically be brought into use.

It may be that the facts brought to light by these investigations will not always be welcome. However, it is clearly the duty of

the Institution to state the facts without bias and without fear, whether pleasant or otherwise. No remedies can be applied without an accurate diagnosis of the disease. However, the Institution is concerned with general principles and practice, and members will appreciate that the names of individual firms would never be quoted in any reports which might be published.

It is hoped that these working groups will in time become a permanent feature of Institution life; their membership may change, but there will be no lack of tasks for them to carry out as the Institution's activities continue to cover an ever broadening field.

OFFERS OF ASSISTANCE

Other ways of assisting the Institution by a personal voluntary contribution will no doubt occur to members. For example, the Institution badly needs a first-class abstracting service to be run in conjunction with the Hazleton Memorial Library, which is to be opened this month. At the moment the Library Maintenance Sub-Committee have accepted responsibility for the preparation of abstracts, but they will probably need to call on individual members to help them in this work. The Chairman of the Committee would no doubt welcome offers of assistance from members who could undertake a limited amount of work of this nature.

It is also hoped to build up gradually a comprehensive index of corporate members and their specialised qualifications and interests, in order to widen the use of the present index cards designed by the Standards Committee for work in connection with B.S.I. These cards could be used to provide panels of members willing to represent the Institution on specialised Committees, to give papers on specific subjects, or to answer technical enquiries.

LOCAL ADMINISTRATION

All these voluntary activities need to be encouraged and organised in the first instance by local Section Committees, who have the necessary personal contacts and who can put members with similar interests in touch with one another. However, Council are most anxious that the work of organising groups of members and canalising their contributions should not fall on the already overburdened Section Hon. Secretaries. Other members of Section Committees will no doubt be ready to assist by acting as liaison officers between their Section Committees and local groups.

FUNCTION OF HEADQUARTERS

The function of Headquarters is to give what guidance and administrative help may be necessary to ensure that all these groups and panels are directing their efforts to a common end, and that their studies are complementary to the work of the Standing Committees.

To achieve really worthwhile results, the work of local groups must clearly be geared to a planned programme ; otherwise their isolated efforts might find no place in the publications of findings which will carry the whole weight of the Institution's authority.

It is therefore the duty of the Research Department at Headquarters to make known to all study groups, through their Section Committees, those aspects of the policy and programme of the Institution which may require research in the field ; to issue notes for their guidance on behalf of the appropriate Standing Committees, and to collect and collate the reports of the Groups for submission to the Standing Committees. This will ensure that the maximum use is made of the voluntary efforts of members. From time to time, it is hoped to publish combined Progress Reports in the *Journal* on the lines of that published in this month's issue, in order to keep the various groups in touch with each other's activities and enable them to avoid unnecessary overlapping.

At present, Research activities at Headquarters are directed by the Research Committee under the Chairmanship of Sir Lionel Kearns, C.B.E., who is also Chairman of the Council of the Production Engineering Research Association. The following members have also been elected to serve on this Committee for the forthcoming year :—

- | | |
|---------------------|--|
| Mr. J. H. Bingham | Mr. Bingham, who is a Consultant, played a leading part in the establishment and guidance of the Institution's Research Department at Loughborough prior to the formation of P.E.R.A. Member of Council. |
| Mr. W. H. Brown | Head of the Department of Mechanical and Civil Engineering, College of Technology and Art, Rotherham. |
| Mr. A. J. Bullivant | Technical Manager, Lamson Engineering Co. and member of Materials Handling Sub-Committee. |
| Mr. F. T. Dean | Chief of Materials Handling Advisory Department, Geo. W. King Ltd., Hitchin. Member of Materials Handling Sub-Committee. |
| Mr. W. J. Dimmock | Assistant Works Manager, Hoover Ltd. Accompanied the Materials Handling Productivity Team to America in 1949 as Secretary of the Team : now a member of the Materials Handling Sub-Committee. |

WORKING GROUPS

- | | |
|---------------------------|--|
| Mr. B. H. Dyson | Works Manager, Hoover Ltd. Joint Chairman of the Joint Committee on Measurement of Productivity, succeeding Mr. W. Puckey who recently resigned from this office. Member of Council. |
| Mr. F. G. S. English | General Manager, Powers-Samas Accounting Machines Ltd., Croydon. Chairman of the Co-ordinating Committee for Croydon District Study Groups on Measurement of Productivity. |
| Dr. D. F. Galloway, B.Sc. | Director of Research, Production Engineering Research Association. |
| Mr. P. Holmes | Research & Development Engineer, Steel Peech & Tozer Ltd., Sheffield. |
| Prof. T. U. Matthew | Lucas Professor of the Principles of Engineering Production, University of Birmingham. Member of the Joint Committee on Measurement of Productivity and Member of Council. |
| Mr. S. W. Nixon, M.Sc. | Manager, Production Development Engineering Dept., Rover Co. Ltd., Tyseley, Birmingham. |
| Mr. G. R. Pryor | Director, Edward Pryor & Son Ltd., Sheffield. Member of Council. |
| Mr. J. B. Robertson | Technical Sales Engineer, Steel & Co. Ltd., Sunderland. Member of Materials Handling Sub-Committee. |
| Mr. M. Seaman, M.Sc. | Director and General Manager, David Brown-Jackson Ltd., Salford Works, Manchester. Member of Council. |
| Mr. A. L. Stuchbery | Chief Technical Engineer, Metal Box Co. Ltd., Chairman of Technical and Publications Committee and Member of Council. |
| Mr. W. J. Webb | Consultant. Chairman of Materials Handling Sub-Committee. |
| Mr. F. Whitehead | General Works Manager, Milner's Safe Co. Ltd., President, Liverpool Section, and Member of Council. |

THE INSTITUTION OF PRODUCTION ENGINEERS

The Secretary of the Research Committee and Head of the Research Department at Headquarters is Miss J. M. Pye, who also acts as secretary of the Materials Handling Sub-Committee and the Joint Committee on Measurement of Productivity. Miss Pye took a Bachelor of Arts degree at Oxford in 1939, and was engaged on intelligence work at the War Office until 1945, when she joined the staff of the Institution. She has held various appointments on the staff, and was appointed Head of the Research Department in December, 1949.

WALTER C. PUCKEY,
Chairman of Council.

HAZLETON MEMORIAL LIBRARY OPENING CEREMONY

Thursday, 26th October, 1950

MEMBERS will no doubt recall that the original Library of the Institution was totally destroyed by fire in March, 1944.

In planning its reconstitution, Council agreed that the new Library should take the form of a permanent memorial to the late Richard Hazleton, to whom the Institution owes so much for his work as its first General Secretary.

Members and friends have responded generously to appeals for funds and books, and on Thursday evening, 26th October, 1950, the Hazleton Memorial Library will be declared open by the President of the Institution, Major-General K. C. Appleyard, C.B.E., T.D., D.L., J.P., M.I.Mech.E., A.M.I.Min.E., A.I.M.E.

The Library will contain books covering all aspects of production engineering. These books will be available to every member of the Institution, a special postal service being arranged for those unable to visit the Library personally. In addition to the ordinary reference facilities, it is intended to inaugurate an extensive information service to deal with members' enquiries, and also an abstracting service. Abstracts of all new books received will be prepared and circulated to members every month with the Institution Journal, commencing with the November issue.

The work of re-establishing the Library has been carried out mainly by members of the London Graduate Section, who have also made the arrangements for the official opening. In addition to the President, other prominent speakers will be the Chairman of Council, Mr. Walter C. Puckey, F.I.I.A., the Right Hon. Lord Sempill, A.F.C., Chairman of the Library Committee, and Mr. William Core, President of the London Section.

Admission to the opening ceremony will be by programme, which may be obtained from Section Hon. Secretaries, or from Head Office.

INSTITUTION NOTES

October, 1950

MEETING OF COUNCIL The next Meeting of Council will take place on Thursday, 26th October, 1950, at 11 a.m., at 36, Portman Square, W.1.

NATIONAL DEFENCE In response to the Prime Minister's recent statement concerning a rearmament programme, followed by his broadcast on 30th July, the Chairman of Council, Mr. Walter C. Puckey, wrote to Mr. Attlee and placed the services of the Institution of Production Engineers at the disposal of the Government.

In a reply from Downing Street, Mr. Attlee expressed his warm thanks and appreciation of the Institution's offer.

JOINT COMMITTEE ON MEASUREMENT OF PRODUCTIVITY Mr. Walter C. Puckey has resigned from the Joint Chairmanship of this Committee, owing to his increased commitments as Chairman of Council.

The new Joint Chairman is Mr. B. H. Dyson, who is also Chairman of the Sub-Committee responsible for drafting a comprehensive Time Study Training Scheme. This Sub-Committee are now preparing a preliminary report.

The I.C.W.A. members of the Joint Committee have been actively working on Machine Utilisation, and are also preparing a report. Mr. F. G. S. English, General Manager, Powers-Samas Accounting Machines Limited, who is Chairman of the Co-ordinating Committee for Study Groups on the Measurement of Productivity in the Croydon District, has been invited to join this I.C.W.A. Group.

Work Measurement Research Survey

It will be remembered that in their Interim Report published in December, 1949, the Joint Committee on Measurement of Productivity set up by the Institution of Production Engineers and the Institute of Cost and Works Accountants, pointed out that present variations in Time Study method as between different companies were far too wide. In particular, the variation in speed and effort rating of an identical operation by different engineers in a small sample group of firms was found to be as much as 12 per cent. Since the publication of their first Report, the Joint Committee have been engaged in the organisation of a nation-wide survey of rating practice, undertaken in collaboration with the Work Measurement

Research Unit of the University of Birmingham, who have already done a considerable amount of research on these problems. All administrative arrangements for the survey have been made by the Joint Committee through the Institution of Production Engineers Headquarters, and local Section Hon. Secretaries.

The survey, which began on 25th September and will end on 2nd November, covers a wide range of industry; the textile, chemical and food manufacturing industries being well represented in addition to the engineering industry. Some 150 firms are taking part and will send 400 to 500 time study staff to carry out rating tests at twelve major industrial centres by means of specially prepared films of typical industrial operations. Two members of the Research Unit, Mr. D. J. Desmond, Research Fellow, and Mr. C. J. Anson, Research Scholar, of the University of Birmingham, will conduct the rating experiments in Birmingham, Leicester, Sheffield, Leeds, Newcastle-upon-Tyne, Dundee, Glasgow, Liverpool, Manchester, London, and Bristol. It is the first time that a survey of this kind has been arranged in this country, although a similar study has taken place in America.

The participating engineers will have an opportunity to compare the quality of their rating with that of a control group of skilled Time Study men. They will also be given particulars of a new method of analysing Time Studies recently evolved by the Research Unit.

The Survey, although primarily a fact-finding investigation to assess the standard of accuracy and consistency in present rating practice, will indirectly serve a useful purpose if it helps to spread knowledge of time study methods amongst industries where its benefits are comparatively little known. Statistical analysis of the many thousands of observations to be collected will take some months, but it is hoped that a report on the Survey may be available by the late summer of 1951.

The Institution's gratitude is due to all those Section Hon. Secretaries who have assisted so greatly by making arrangements for local gatherings of time study engineers within their own areas. Without their help, the administrative difficulties of organising this large scale survey would have been multiplied many times.

SECTION ACTIVITIES

WESTERN With a view to establishing relationship with other Institutions, the Western Section have arranged a Joint Discussion with the Institution of Cost and Works Accountants on "Measurement of Productivity." In addition, a Joint Lecture with the Gloucestershire Engineering Society and The Plastics Institute has been arranged to take place in Stroud.

The Work Measurement Research Survey for this district will be conducted in Bristol on 2nd November, 1950, in the Bristol College of Technology.

The Section Annual Dinner and Dance will be held on Wednesday, 25th October, 1950, at the Berkeley Cafe, Bristol.

**WOLVERHAMPTON
GRADUATE**

The Section visit to the Bristol Aeroplane Company on 3rd June, 1950, was attended by 120 members.

In the morning the party made a conducted tour of the Engine Division, following which they were entertained to lunch in the Aircraft Division Staff Canteen, by Mr. G. W. Wright, M.I.Prod.E., Vice-Chairman of the Western Section.

A Vote of Thanks to the Bristol Aeroplane Company and the Western Section for their hospitality was proposed by Mr. S. R. Tyler, Chairman of the Wolverhampton Graduate Section.

After lunch the party visited the Brabazon I and II, which were examined with the greatest interest.

On leaving their Bristol hosts, the party were taken to Cheddar and toured the famous caves, and a highly successful outing terminated at six o'clock in the evening.

WORKING GROUPS

Progress Report

Now that many Sections are actively considering the establishment of Working Groups or Study Groups, as a contribution to the Institution's research activities, members may be interested to hear of the progress made by those groups already in being. The groups are listed below according to their subject: although materials handling has, of course, a close bearing on productivity measurement, these two broad subjects will be treated independently by the Committees now studying them, and separate Reports will eventually be issued.

**MATERIALS
HANDLING**

In this field, the Birmingham Section have set up a Group under the chairmanship of Professor T. U. Matthew, which has held several meetings. Mr. T. W. Elkington, a member of the Birmingham Section Committee, has been elected Vice-Chairman, and Mr. W. A. Robinson acts as Secretary. The Group have selected "Inter-process Transfer Mechanisms" as an appropriate subject for study in the Birmingham area, where industry comprises many medium and small sized concerns. Members of the group represent a wide range of industry, and the majority have extensive experience of handling problems.

The London Graduate Section have an active group led by Mr. R. Thorn, a member of the Section Committee. The group are making a special study of Stillages, and intend to arrange a number of works visits. Members of the group will also search for suitable case studies amongst material published in the Technical Press.

MEASUREMENT OF PRODUCTIVITY

The London Section have now set up active Study groups in the Croydon area, to study Measurement of Productivity from the points of view of Material, Labour, and Equipment Utilisation. Mr. F. G. S. English, General Manager of Powers-Samas Ltd., Croydon, introduced the subject at a preliminary meeting with a short paper entitled "Some Notes on the Measurement of Productivity." A Co-ordinating Committee had been formed to link the activities of the various groups, with Mr. English as Chairman; Mr. J. W. H. Smith is acting as Group Secretary and Mr. H. W. Townsend, a member of the London Section Committee, attends meetings in order to maintain liaison. The groups will study the manufacture of a fractional horse-power electric motor in batch quantities of 1,000: members of the groups are proceeding to provide a manufacturing layout for each piecepart. Some items will be treated as "bought out" units. The groups will hold a joint meeting on 10th October, 1950, when preparatory work will be reviewed, and decisions reached regarding future study by individual groups. Any members interested in joining the Croydon Study Group should communicate with the Group Hon. Secretary, Mr. J. W. H. Smith, A.M.I.Prod.E., at Powers-Samas Accounting Machines Ltd., Aurelia Road, Mitcham Road, Croydon.

The London Graduate Section has had an active group on Work Measurement in operation for several months under the leadership of Mr. W. E. Mosse. This group is expected to present an interim Report very shortly.

TECHNICAL EDUCATION

A number of Graduate Sections have established Study Groups to deal with particular aspects of Technical Education.

GROUPS UNDER CONSIDERATION

The establishment of Working Groups is being discussed in a number of other Sections, including the Western, South Wales, West Wales, Eastern Counties, Southern, Preston, Manchester, North-Eastern and Luton Graduate Sections. The Research Committee would be glad to have particulars of any additional Working Groups now in operation.

Members who would like to take part in this work and who are not aware of any Groups yet formed within their Sections, should get in touch with their local Section Hon. Secretary.

NEWS OF MEMBERS

Mr. A. H. Aston, Associate Member, has been appointed Assistant Works Manager to Thomas De La Rue & Co. Ltd., N. Shields.

Mr. Robert L. Aston, Associate Member, has been appointed Senior Assistant in Production Engineering at Cardiff Technical College.

Mr. H. Bolton, Associate Member, was recently appointed Lecturer in Production Engineering subjects at Huddersfield Technical College.

Mr. P. Buchanan, Graduate, is now Chief Engineer to A. F. Stoddard & Co. Ltd., Elderslie, Renfrewshire.

Mr. Ivor M. Campbell, Graduate, is now Production Manager to E. W. H. Stanleigh & Co. Ltd., Colevaine, N. Ireland.

Mr. L. C. Carr-Locke, B.Sc., Associate Member, is now practising independently as a consultant on matters of production organisation, with temporary headquarters at Tiverton, Devon.

Mr. E. S. Carter, Associate Member, is now Chief Draughtsman with L. H. Newton, Ltd., Birmingham.

Mr. Walter Colley, Associate Member, and Mr. A. Grocock, Associate Member, of J. & H. McLaren, Ltd., Leeds, have recently returned from the United States, where they have been studying American production methods.

Mr. G. Cubitt-Smith, Graduate, is now studying in America under the terms of an Economic Co-operation Administration Award.

Mr. A. J. Deeley, Associate Member, is now Works Manager with Taylor, Sow & Co. Ltd., Stourbridge.

Mr. H. Dodd, Associate Member, is now in charge of Workshops and Drawing Offices at West Oxfordshire Technical College, Witney, Oxon.

Major A. G. Hayek, Associate Member, has been appointed a Director of the newly-formed company, Thackwell & Hayek, Ltd., of Birmingham and Stoke-on-Trent.

Mr. F. Knight, Associate Member, is now Works Manager of S. Dixon & Sons, Ltd., Swinegate, Leeds.

Mr. H. M. Knight, Associate Member, is now Manager of the Spring Works of Price Bros. Ltd., Wellington, Somerset.

Mr. W. R. Larby, Associate Member, is now Mould Shop Superintendent for R. H. Windsor, Ltd., South Chessington, Surrey.

Mr. R. W. Pile, Associate Member, has been appointed Works Manager of Avery-Hardoll, Ltd., Tolworth.

Mr. Godfrey C. Pitt, Graduate, is now Lecturer in Workshop Technology (Production) at Glamorgan Technical College, Treforest.

Mr. Norman Rowbotham, Member, has been elected to the Council of P.E.R.A., and has also accepted an invitation to serve on the Board of Governors of the Bristol College of Technology.

Mr. W. Shelton, Graduate, was recently appointed Chief Development Engineer with Thomas Locker & Co. Ltd., Warrington.

Mr. H. H. Valberg, Associate Member, M.I.B.F., A.M.I.I.A., is now Production Controller, Foundry Group, Hadfields Foundry and Engineering Co. Ltd., East Hecla Works.

Mr. G. N. Venn, Associate Member, was awarded first class honours in the recent External B.Sc.(Eng.) examination of the University of London.

Mr. R. J. C. Whitaker, Graduate, is now Senior Production Engineer with The Glacier Metal Co. Ltd., Alperton, Middlesex.

RETIREMENT OF On 1st June, 1950, nearly two hundred leaders **MR. JACK FINLAY**, of Australian private industry attended a **M.B.E., Hon.M.I.Prod.E.** Testimonial Dinner in Sydney in honour of Mr. Jack Finlay, M.B.E., and Florence Taylor Memorial Medal winner. Mr. Finlay retired last May after nearly forty years service with the Lithgow Small Arms Factories, of which he was General



Manager, and where he had pioneered, established, and developed production techniques new to Australia.

The photograph on previous page shows Mr. Finlay (left) receiving from Mr. E. G. Bishop (President of the Sydney Section), who presided at the Dinner, a presentation cheque subscribed by those associated with the function, and an engraved book commemorating the occasion and containing the following tribute:—

“ Mr. Jack Finlay :

“ On the occasion of your retirement from the position of General Manager of the Small Arms Factories, Lithgow, your many friends in the Metal Trades and Allied Industries wish to express their appreciation of the peerless friendship, help and advice you have always so wholeheartedly given them.

“ Your pioneer efforts, your invaluable service in war and peace, your unique knowledge and the generous way in which you have shared it leaves a lasting glow of gratitude that defies expression.”

At the Council Meeting of the Institution of Production Engineers held in London on 27th July, 1950, it was unanimously decided to ask Mr. Finlay to accept Honorary Membership in recognition of his long and valued service to the Institution in Australia.

OBITUARY The Institution records with deep regret the death of Mr. Alfred Ewing, Member, Managing Director of Sanderson Bros. and Newbould, Ltd., Sheffield.

BRITISH STANDARDS The following Standards have recently been issued and are obtainable from the British Standards Institution, 28, Victoria Street, Westminster, London, S.W.1., at the prices indicated :

328 : 1950-Twist Drills and Centre Drills (Price 6/- post free)
I.Prod.E. representative on appropriate B.S.I. Committee; Mr. J. E. Baty.

1453 : 1950-Steel Filler Rods for Gas Welding of Mild Steel (Price 1/- post free).

BOOKS RECEIVED “Centreless Grinding,” Vol. II. Arthur Scrivener, Ltd., Birmingham.

Developments in the application and technique of centreless grinding, including the fully automatic controlled-cycle machine, and the growth in the employment of wheel crushing, have been the factors necessitating the compilation and publishing of this revised edition of the original volume with the same title.

The new volume gives complete details of all the aforementioned developments, together with a section of revised data sheets which give an adequate picture of the capabilities associated with modern machines. The general user, however, is not forgotten and many

examples are given of simple classes of work carried out on general purpose machines.

Volume II has been compiled on the presumption that the general reader is already familiar with the basic principles of centreless grinding. (This information was included in Volume I).

The book is very well printed on good quality paper, and is divided into four sections. Section One is concerned with the latest developments in centreless grinding technique and describes in great detail general methods of procedure as well as many of a specialised and unusual nature, and includes full information on up-to-date wheel crushing technique.

Section Two is devoted to descriptions and specifications of the latest machines, among which are included centreless thread grinders and specially designed piston grinders.

Section Three is a treatise on all types of automatic operation and ancillary topics, whilst Section Four consists of 31 pages given over to production data varying from the grinding of low tensile materials such as plastic beads, to hardened steel shafts of various lengths and diameters.

This new volume is undoubtedly a worthwhile addition to the Production Engineer's library and should prove useful to all concerned with this phase of production.

A.A.F.

"Layout Planning Techniques" by John R. Immer. McGraw-Hill Book Co. \$5.00.

This book is a valuable work of reference, efficiently arranged, and covers an immense field.

It is divided into six parts, of which the first deals with layout analysis, material flow in both factory and office, with many informative illustrations and diagrams.

In Part 2, examples are given of Layout Planning as applied to various industries, including farms and merchandising.

Part 3 covers assembly line layout, specialisation of labour, progressive assembly and sub-assembly, production flow, jigs and fixtures and flexibility.

The fourth part demonstrates the information to be collated in order to present a layout, the establishing of lines of flow, preparations of plant layout drawings, templates, the use of scale models and cost of installation.

The handling of materials and material handling equipment is described in Part 5, whilst the sixth part presents interesting actual case studies.

To describe even briefly the mass of information contained in this book would necessitate a lengthy review. It comprises 430 pages giving descriptions and copious illustrations of existing layouts of the operating practices of many factories. For students and

factory planning engineers seeking up-to-date knowledge on this wide subject, this book will be of great value.

H.G.

"Suggestion Schemes" (Third Edition). Industrial Welfare Society, London. 2/6 post free.

This small booklet may be considered very helpful to those contemplating installing such a scheme in their business.

Aims and objects are explained together with suggestion schemes in practice, and the working of such schemes is fully explained with suggestions as to the administration of the scheme and methods for the assessment of awards.

Types of suggestions invited and examples of the various forms necessary for the working of such schemes are also explained.

A.R.

"Are Workers Human?" by Gordon Rattray Taylor. The Falcon Press, London. 10/6 net.

"Stores Control Procedures" by H. H. Norcross, F.C.W.A., A.I.Prod.E. Office Management Association, London. 5/- net.

IMPORTANT In order that the Journal may be despatched on time, it is essential that copy should reach the Head Office of the Institution not later than 40 days prior to the date of issue, which is the first of each month.

ISSUE OF JOURNAL Owing to the fact that output has to be adjusted to meet requirements, and in order to avoid carrying heavy stocks, it has been decided that the Journal will only be issued to new Members from the date they join the Institution.

SECTION MEETINGS

The following meetings have been arranged to take place in November, 1950. Where full details are not given, these have not been received at the time of going to press.

November

- 1st **Liverpool Graduate Section.** A lecture on "Some Impressions of the Graduates Visit to Sweden" will be given by Mr. G. Smith, Grad.I.Prod.E., at the Exchange Hotel, Tithebarn Street, Liverpool, at 7-45 p.m.
- 1st **Wolverhampton Section.** A lecture on "Working Pace and Incentives" will be given by Mr. Lewis C. Ord at the Dudley and Staffordshire Technical College, Castle View, Dudley, at 7-00 p.m.
- 1st **Nottingham Section.** A lecture on "Measurement of Productivity" will be given by Mr. T. W. Badgery, F.C.W.A., at the Victoria Station Hotel, Milton Street, Nottingham, at 7-00 p.m. (Joint Meeting with the Institute of Cost and Works Accountants.)
- 3rd **Wolverhampton Graduate Section.** There will be a Dance at the Star and Garter Hotel, Victoria Street, Wolverhampton, at 8-00 p.m.

November—cont.

- 6th **Coventry Graduate Section.** A lecture on "Motion Study" will be given by Mr. R. Avery, at Greyfriars Rooms, The Geisha Cafe, Hertford Street, Coventry, at 7-15 p.m.
- 6th **Halifax Section.** A film, "Precision with Production" (Hydroptic Boring and Milling), introduced by Mr. G. H. Clements, will be shown at the White Swan Hotel, Halifax, at 7-15 p.m.
- 7th **Reading Sub-Section.** A lecture on "Requirements for Efficient Production" will be given by Mr. Lewis C. Ord, at the Great Western Hotel, Reading, at 7-15 p.m.
- 8th **Preston Section.** A lecture on "Engineers Clay" will be given by Mr. F. Westall, M.A., A.M.I.M.E., A.M.I.Prod.E., at the Harris Institute, Corporation Street, Preston, at 7-15 p.m.
- 9th **Liverpool Section.** A lecture on "Inspection Standards As An Aid to Production" will be given by Mr. J. Hobbs, at Radiant House, Bold Street, Liverpool, at 7-15 p.m.
- 9th **Southern Section.** A lecture on "The Production Engineer—His Education and Training" will be given by Mr. T. B. Worth, M.I.Mech.E., M.I.E.E., M.I.Prod.E., at the Polygon Hotel, Southampton, at 7-00 p.m.
- 10th **North Eastern Graduate Section.** A lecture on "Planning of Production in the Bedding Industry" will be given by Mr. L. Walmsley, Grad.I.Prod.E., at the Neville Hall Mining Institution, Westgate Road, Newcastle-upon-Tyne, 1, at 7-00 p.m.
- 10th **West Wales Sub-Section.** A lecture on "Electrolytic Tinning" will be given by Mr. W. E. Hoare, B.Sc., at the Central Library, Alexandra Road, Swansea, at 7-30 p.m.
- 11th **Yorkshire Graduate Section.** A lecture on "Refrigeration" will be given by Mr. E. Hargreaves, A.Inst.R., M.A.S.R.E., at the Great Northern Station Hotel, Leeds, 1, at 2-30 p.m.
- 13th **Sheffield Section.** A lecture on "Mechanical Handling" will be given by members of the Anglo-American Productivity Team, led by Mr. A. Roebuck, M.I.Mech.E., at the Royal Victoria Station Hotel, Sheffield, at 6-30 p.m.
- 13th **Yorkshire Section.** A lecture on "Activities of the Production Engineering Research Association" will be given by Dr. D. F. Galloway, B.Sc.(Hons.), M.I.Mech.E., A.M.I.E.E., M.I.Prod.E., in the Hotel Metropole, King Street, Leeds 1, at 7-00 p.m.
- 14th **Birmingham Section.** There will be a Joint Meeting with the West Midlands Branch, Institution of Works Managers, to discuss "The Role of the Production Engineer in Industry," in the Grand Hotel, Birmingham, at 7-00 p.m.
- 14th **Birmingham Graduate Section.** A lecture on "Steel Production—With Special Reference to Alloy Steel Manufacture" will be given by Mr. E. Booth, at the James Watt Memorial Institute, Great Charles Street, Birmingham, at 7-00 p.m.
- 14th **Coventry Section.** A lecture on "Management's Role in the Improvement of Industrial Efficiency" will be given by Sir Charles Bartlett, M.I.Prod.E. (Joint Meeting with the Institute of Industrial Administration.)
- 14th **Dundee Section.** A "Local Talent Night" will be held at Mathers Hotel, Whitehall Crescent, Dundee, at 7-30 p.m.

November—cont.

- 14th **London Graduate Section.** A lecture on "The Workshop Application of Cutting Tool Theory" will be given by Mr. H. H. Langshur, G.I.Mech.E., Grad.I.Prod.E., at the Institution of Production Engineers, 36, Portman Square, London, W.1, at 7-15 p.m.
- 14th **London Graduate Section.** A Works Visit to Vickers Armstrongs Ltd., Weybridge, Surrey, will take place at 2-30 p.m.
- 14th **Western Section.** A lecture on "Some Interesting Set-ups on Modern Machine Tools" will be given by Mr. R. C. Fenton, M.I.Prod.E., at the Grand Hotel, Broad Street, Bristol, at 7-15 p.m.
- 15th **Birmingham Section.** A lecture on "Production Engineering Methods Applied to Furniture Manufacture" will be given by Mr. R. Dolman Bibby, at the James Watt Memorial Institute, Great Charles Street, Birmingham 3, at 7-00 p.m.
- 15th **Edinburgh Section.** A lecture on "Costing in Relation to the Production Engineer" will be given by Mr. W. A. Eastwood, A.C.W.A., at the North British Station Hotel, Edinburgh, at 7-30 p.m.
- 15th **Manchester Graduate Section.** A lecture on "Textile Production Engineering" by G. A. D. Coghlan, B.Sc.(Eng.), A.M.I.E.E., will be held in the Reynolds Hall (Room C.3), College of Technology, Sackville Street, Manchester, at 7-15 p.m.
- 15th **Northern Ireland Section.** A lecture on "Measurement of Productivity" will be given by Mr. A. E. Clifford, in the Municipal College of Technology, Belfast, at 7-30 p.m.
- 16th **Glasgow Section.** A lecture on "Latest Developments in Grinding Machines" will be given by Mr. H. Bottomley, Grad.I.Prod.E., at the Institution of Engineers and Shipbuilders, 39, Elmbank Crescent, Glasgow, C.2, at 7-30 p.m.
- 16th **London Section.** A lecture on "Research in Relation to Production Engineering" will be given by Dr. D. F. Galloway, B.Sc. (Hons.), M.I.Mech.E., A.M.I.E.E., M.I.Prod.E., at the Royal Empire Society, Northumberland Avenue, London, W.C.2, at 7-00 p.m.
- 16th **Wolverhampton Graduate Section.** A lecture on "The Geologists' Search for New Materials of Engineering Production" will be given by Mr. A. J. Aiers, M.I.Mech.E., M.I.Prod.E., at West Midland Gas Board Demonstration Room, Clarence Street (off Waterloo Road), Wolverhampton, at 7-15 p.m.
- 17th **Eastern Counties Section.** A lecture on "Mechanical Handling" will be given by Mr. W. J. T. Dimmock, A.M.I.Prod.E., at Ipswich Public Library (Old Foundry Road entrance) at 7-30 p.m.
- 20th **Derby Sub-Section.** A lecture on "Glass and the Engineer" will be given by Dr. A. J. Holland, M.Sc., at the School of Art, Green Lane, Derby, at 7-00 p.m.
- 20th **North Eastern Section.** A lecture on "Foremanship" will be given by Mr. A. P. Young, O.B.E., in the Neville Hall Mining Institution, Westgate Road, Newcastle-upon-Tyne, 1, at 7-00 p.m.
- 20th **Manchester Section.** A lecture on "Production and Inspection of Gears" will be given by Mr. J. Milwain, M.I.Prod.E., M.I.E.I., at the College of Technology, Sackville Street, Manchester, at 7-15 p.m.
- 21st **Coventry Section.** A lecture on "Production of Castings for Quantity Machining" will be given by Mr. J. Pardoe, M.Eng., A.I.M., in the Greyfriars Rooms, The Geisha Cafe, Hertford Street, Coventry, at 7.15 p.m.

November—cont.

- 21st **Western Section.** A lecture on "Mechanical Handling" will be given by Mr. J. R. Sharp, at The College, Swindon, Wilts, at 6-30 p.m.
- 24th **South Wales & Monmouthshire Section.** A lecture on "Layout for Batch Production" will be given by Mr. W. E. Mosse, Grad.I.Prod.E., at the South Wales Institute of Engineers, Park Place, Cardiff, at 6-45 p.m.
- 24th **Halifax Section.** The Annual Dinner and Dance will be held at the George Hotel, Huddersfield.
- 25th **Birmingham Section.** A Buffet Dance will be held at the Grand Hotel, Birmingham.
- 28th **Luton Section.** A lecture on "The Art of Scientific and Economic Lubrication" will be given by Dr. Ing. E. Schindler, and Mr. O. E. Nekolla, Dipl.Ing., in the Small Assembly Room, Town Hall, Luton, at 7-15 p.m.
- 29th **London Graduate Section.** There will be a Works Visit to the Plessey Co. Ltd., Ilford, at 2-30 p.m.
- 29th **Lincoln Section.** There will be a Works Visit to Smith, Clayton Forge Ltd., Tower Works, Lincoln, at 6-30 p.m.

THE FUTURE OF PRODUCTION ENGINEERING

By C. R. WHITAKER, M.I.Prod.E.*

To be presented to the London Section of the Institution, 12th October, 1950

PAUSE for a moment, take a breather, it will do us good in these days of difficulty and frustration ; review the road we have travelled, the hill we have climbed, and then, refreshed and taught by the lessons gathered, we may look to the vista of the future and get a better perspective of our course, correcting so far as we may the errors of the past.

Some forty years ago a young man walked out one evening with the intention of calling upon a friend. If an interested observer had been present, he would have noted a somewhat anxious demeanour giving evidence of necessity, coupled with a full determination to get there. The purpose of his visit was to ask his friend if he could tell him what a jig was ; the knowledge was essential for he had determined to secure a post as a jig and tool draughtsman with a large organisation.

Some years later, when he had made his way almost to the point of becoming a modest authority on production methods, he in turn was asked by the director of a considerable undertaking the same question—what is a jig ?

Many a Production Engineer of the present day will experience the twang of a sympathetic cord and will recall the time when he had to engage himself to a firm as a tool draughtsman or in some other category before he could secure an opportunity of demonstrating the advantages of improved production methods.

RECOGNITION ACHIEVED

With grit and grind, kicks and ha'pence, and the far-seeing energy and devotion of a few pioneers who formed and established the Institution of Production Engineers, the profession has now come to be recognised at its true value to the community and indeed to the very existence of civilised mankind.

But what of the future ? It is well to review the history of Production Engineering and learn lessons from it, and, at the same time, very necessary to look ahead and to estimate so far as we may the trend and direction of our efforts. No one will deny that the stimulus up to the present time has come from quantity production, the producing of more and more at a cheaper and cheaper cost, accentuated by the requirements of the two World Wars.

*Production Research Engineer, E.M.I. Factories, Ltd., Hayes.

The prospect of war overshadows the world still with its grim menace and we may be called upon yet again to mass produce its commodities. Slaves of necessity, mankind may have to sweat and toil to produce from the earth and the elements the wherewithal to survive. Is that then the future to which we look? Surely not, and the sanest way to approach a lasting peace is to make ready for its dawning.

**PROBLEMS OF
QUANTITY PRODUCTION**

In most of our great and small organisations the stage is set, or is being set, for production of commodities in large quantity, and where do we find ourselves? The economic position of the world still leaves markets open for our goods but unless these markets can be co-ordinated to provide a large enough demand, quantity production either cannot begin or we cannot produce at a competitive price. Many markets are lost while efforts are being made to increase the aggregate demand. While each nation is engrossed with its own problems, even the will to co-operate with its neighbours is not sufficient to bring about co-ordination in the timing and placing of orders for goods which would enable manufacturers to depend upon large quantities in the aggregate. Such desirable condition is likely only if men of goodwill representing the manufacturers can travel freely over the world, meeting and persuading men of goodwill to fall into line with their neighbours to the mutual advantage of all. That would enable manufacturers again to launch out into quantity production, but only of certain articles common to the various tastes, traditions, and general requirements of the different peoples.

Is it desirable that peoples and individuals should adjust their tastes and traditions to a common level? Opinion may differ upon the subject but it is certain that now, and for a long time in the future, such conditions will exist.

**USE OF
STANDARDISATION**

Something of the difficulty of co-ordinating the requirements of different peoples is represented by the comparatively simple case of the recent agreement reached between America, Canada, and ourselves in connection with screw-threads, the result of many years' negotiation.

The question then arises as to what should desirably be produced by quantity production methods, and what should not. Generally, we may say that it is wise to standardise or quantity produce any article, component part or unit which has by custom become recognised as being in itself a common requirement of many people, or, by reason of its being complementary to the making of varieties of composite commodities, not severally required in large quantities, is a common requirement in all of them.

In the first category fall such things as domestic utensils, pencils,

drills, taps, etc., and, in the second, such things as screws, nuts and washers, paints, electronic valves, resistors and condensers, and standard or proprietary equipment such as ball bearings, small electric motors, etc. These items should be mass or quantity produced.

On the other hand and equally important are items which should not be quantity produced. Certainly no item, the production of which directly expresses human individuality, that is art in the inspiration and design and craftsmanship in the execution; no item which has for its object personal aesthetic appeal or individual requirement. Under these headings fall styled clothing, styled furniture, yachts, class locomotives, and special purpose machinery.

A VITAL MARKET

In between these two extremes stands a vital market, which due largely to concentration upon quantity production, seems to suffer from some neglect. At any rate that challenge may serve to direct attention to the condition.

Every Production Engineer knows that for the mass production of an article a number of functions are involved which must be subordinated to a fairly stereotyped system. The functions are, after completion of the design of the article, process layout, ratefixing, estimating, planning, shop orders, and orders for materials, tool design and manufacture, tool try-out, goods inwards, stores inspection, stores control, progressing, parts manufacture, parts inspection, assembly, assembly inspection, final inspection and test routing, shop clerical, accounts, purchasing, factory control, payment systems.

Now in the case of continuous production of an article or series of similar articles, some of which have been mentioned earlier, screws, electronic valves, ball-bearings, etc., the co-ordinating of the functions referred to is a work which can be developed and perfected until, within the limits of circumstance, a truly efficient flow of production should result.

The amount of processing, ratefixing, estimating, planning, tooling, and set-up, is a negligible proportion of the amount of direct material cost and labour: but as we get further away from continuous production the proportion of system loading becomes higher until a level is reached at which it begins to be a burden on efficiency.

Again, the more progressive the design of the product, the more difficult and costly is the application of mass production methods to it. Conversely, the more a product is mass produced, the more difficult is a deviation from its design.

A PRACTICAL EXAMPLE

An example of this is the television receiver. Television is a comparatively new art and the development of it from all angles is in its 'teens. The market is increasing by stages consequent upon the erection of new transmitting stations. Demand is in excess of supply. The

demand is variable due to differences in those transmitters and will continue to be variable in order to meet new requirements such as increased range, multi-channel reception, conditions of interference, improvement of photography and transmission, and the introduction of colour. In addition, the types of preferred receivers will vary with the possibilities of projection and portability. In the receivers themselves, improved reliability, improved or larger tubes, improved valves and lenses will reduce installation and servicing costs, while improved methods of design should cut out many of the variables in manufacture and test.

A truly economical quantity for manufacture of an article of this nature at its present stage may not need to be in excess of 10,000 and should embrace as low as 1,000. The cabinets in which the equipment is housed may, with advantage, be based on a quantity as low as 1,000, allowing for greater variety of style.

Components used in the build-up of the equipment should be standardised as far as practicable, but the making of the equipment should be flexible to admit of batch changes in design.

Efforts to produce in large quantities while development is proceeding at high level tend to discourage the acceptance of small orders, and to embarrass development and design by driving them into channels of consideration directed towards the economics of quantity production instead of towards improvement and reliability, at which stage only can a commodity become suitable for quantity production. Quantity production should increase as development falls, and, while development is high, batch production should be the order of the day.

The Production Engineer therefore should set out to cater for this condition positively and not, as is often the case, find himself embarrassed by it. To this end then consideration may well be aimed—a set-up whereby process layout, ratefixing, planning, issuing of shop orders and tooling, are curtailed or eliminated and factory control and payment systems modified. The time necessary to prepare for quantity production is a deterrent to the acceptance of small orders.

The point may be illustrated by an example. A certain radio receiver was estimated on a basis of 20,000 models. The tooling cost allowed was £1,500. Approximately 1,000 models were made in a small section at an actual tool cost of £312. Most of the tools were suitable for up to 10,000 and could have been repeated where necessary for a further 10,000. It is considered that the cost of making the receiver in batches of 1,000 in a small section, handling the whole business, would not be greater than the estimated cost of making the 20,000 on a quantity basis.

The press tools were mostly made of $\frac{1}{4}$ " gauge plate and the assembly fixtures of wood, bushed or faced where required with

metal inserts or plates respectively. They answered very well and were quickly in production. If a point fouled, it was just cut away with a knife or chisel.

A NEW APPROACH TO TOOLING

Because we are so mass production conscious our tooling, even for small and batch quantities, tends to be massive and adequate for the production of many thousands and millions of parts. This is a direct consequence of many accent being continually pointed to large quantity production. If our tool designers were encouraged to use the ingenuity of which they are peculiarly capable, the manufacture of commodities could be going forward rather than waiting while tools are designed and made which are suitable for doing the work many times over.

Are we not resting too much on hopes of large quantities for manufacture, which quantities do not come? We are set for quantity production and, because of that, are keeping set, while vital smaller orders are passing us by. Surely our outlook should be to flex our organisations to present-day requirement and it will be found that by so doing we shall be stepping up to the quantity production of many more commodities than we dream of in aiming to mass produce everything we touch.

When a commodity has to be made, why not make it and not hang about in the hope that some fortunate circumstance may direct the wheel of higher demand for it?

Mass production has carried with it a curse as well as a blessing. We have forged link by link a chain with which to fetter ourselves and there is no reason why we should not immediately turn our attention towards breaking free.

We are constantly being urged to increase production, the words have become almost a parrot cry, and emanate chiefly from specialists in finance who are anxious to make up the dollar shortage. We have no quarrel with them and appreciate their efforts, but they are not the people who can tell us how to do it and they are out of their depth when they try. Nevertheless they do try, and the consequence is, our entire effort is being directed towards more and more mass production to the exclusion of everything else. We are encouraged to mould our industry more and more on the pattern of American industry and methods; we are in fact led to believe that unless we can emulate, equal or surpass America in mass production, there is little hope of success.

Well, we have a profound respect for Americans; they do their job well and we shall have to be very clever to beat them. We must not forget too that if faced with serious competition from us, they can still do better. But what of our job? Are we blinded to the fact that we have a job and an individuality of our own? Let us examine the question.

BUSINESS ON A NATIONAL BASIS

We have as a nation that which no other nation has, the whole world's markets open to us. But the various peoples have various tastes and requirements and many of the commodities they require are severally in comparatively small quantity. We have the advantage that, through generations, we have earned a reputation for quality, reliability, and fair dealing. Our business men, in pursuing their normal course in all parts of the world, have by virtue of that proved to be our best ambassadors. We are, as a nation and Commonwealth, spread all over the world and our vital interests are just as widely dispersed. The "Little England" complex has found no root and has given place to "Great Britain." Politically, economically, and commercially, we are essentially concerned with the nations and, in addition to those ties, we are still looked up to for moral world leadership in standards of justice and tolerance.

Where are we going? Are we to keep all these business men at home to help in a production drive to outstrip America in mass producing commodities which we and they say the nations must buy? Or are we going to maintain and improve the relations built up over centuries by our merchants, by adventure, diplomacy, integrity, and enterprise, in studying the wants of other countries and fulfilling our natural function of manufacturing and supplying those needs?

An American industrial expert has been quoted as saying that while his country has no superior in organised production efficiency he did give equal credit to Britain for its ability to improvise, and that we were apparently cheaper in the making of small quantities. Americans perceive that, and why then should we concentrate our whole attention on mass production which is their natural function, meriting our reciprocal respect.

Every Production Engineer enjoys having a good run of productivity after the trouble he takes to launch it. By all means let us have as much of it as we can, but no one knows like the British engineer the intense interest which centres round the problems of economics presented by small quantity production, and no one knows better than he, if he will only think of it, that it is his particular and natural *forte*. No people can beat us at it but we need to be constantly reminded of the fact.

STUDYING THE HUMAN FACTOR

Some matters of basic interest present themselves. In mass production, we have to look back with some shame to our failure to study sufficiently the human factor. We need not reproach ourselves too severely because we too have been the creatures of circumstance and, in our endeavours to keep on top of competition, have swung diligently into a system which seemed to offer many benefits to all. The

attitude developed by the "workers" in formulating their demands for their "rights" encouraged, if not obliged, the employers to adhere to rules which better judgment may have shown to be inadvisable.

For instance, the time for an operation would be halved by the introduction of a new jig. At the same time, the fixing of the new rate would ensure that the operator could earn only the same as he did whilst using the old method. The gain was all to the employer and it was difficult to see how the operator could benefit, with the result that his attitude towards the new tool would at best be neutral and more likely antagonistic. We lost the enthusiasm of the "worker" for improved methods, whereas if a small proportion of the advantage gained could have been awarded to the worker his interest could have been maintained.

Again many operations, especially line operations, employed the majesty of the human being as a function of the mechanism. From that evil sprang a worse, the introduction of monetary incentive. To spur men and women to greater effort various systems of monetary incentive were inaugurated, with the inevitable result that the wage-earners became conscious only of their wages and the work became abhorrent to them. Following that, inspection and supervision had to be augmented and inspection introduced as an operation in the production line, in order to catch bad work before it got through to the following operations where time and money would be spent on something which would have to be rejected after all.

MONETARY INCENTIVES Wages became almost the sole obsession of the Trade Unions, whose function should be directed towards the welfare of the worker by education, physical training, training of young craftsmen and workers, and, above all, co-operation with the interests of the employers. Instead they found themselves engrossed with the never-ending clash of wage problems and the arrangement of payment systems. So formidable has this become that the outside of a worker's wage packet today is a study in itself, and it is not uncommon to see workers discussing the intricacies of it. Wage consciousness increases. Monetary incentives have defeated their own ends by becoming stabilised as part of the expected wage, and more and more incentive has to be added to stimulate the worker. Higher becomes the load which the State and the Unions place on the shoulders of the employers in working out week by week the correct wage of each individual employee.

It may be objected that any monetary reward is an incentive and it is reasonable to admit that.

In defining exactly what we mean and do not mean by the term

'monetary incentive', we mean the positive act of setting up monetary gain as the goal of human endeavour, and the negative act of assuming thereby that human endeavour cannot be made to respond as well to other influences as it can to that. We mean the negation of all the attributes of leadership by the substitution of monetary aims. The attributes of leadership are the recognition of human dignity; the cultivation of the team spirit which is, that leaders and lead acknowledge their loyalty to a purpose above themselves towards which all contribute; the administration of justice and the co-ordinating of individual effort.

We do not mean the natural anticipation of improved reward for better work done, or for higher status reached.

If a man is working well and we offer him money to work better and quicker we are wrong. If he can himself, or can be taught to, work better or quicker, and we reward him when he has improved, we are right. If a man is not working well, and we offer him money to work better, we are wrong, but if he improves or can be taught to work better, and we then reward him, we are right. All worthwhile men aspire to improve their position and not merely to get, but to deserve and get more money.

SELECTION OF SUPERVISORS

In adopting monetary incentive we are apt to overlook the selecting and training of our supervisors. We are apt to select the type of man who can run a system and can keep a machine going, ignoring the fact that the principle part of that machine is the human element, subject as it is to all the vicissitudes of sentiment. We rest satisfied that, whatever the character and aptitude of the supervisor, the incentive will ensure the output we want.

What a difference it would make, what characteristics we would require in and call out of that supervisor if we would depend on him and not the incentive to draw out of the members of his team the best of which they are capable. We forsake something of real value to purchase something of monetary value.

We are inconsistent, too. The people upon whom we most depend are those who negotiate the contracts and the supplies of material and labour, those who plan, devise the best methods, design and make the tools, without which functions the operators could not work at all. But because their work is not measurable in terms of monetary value, we reward them by the alternative incentives of recognition, mutual understanding, mutual loyalty, mutual trust and a fair wage. We deny those incentives to the workers—why? Because we do not believe that they will respond to them, and in denying them we do nothing towards developing mutual recognition, understanding, loyalty, and trust. We sacrifice those incentives and substitute a monetary incentive.

If an employee is skilled in his work and finds pride and satisfaction in doing it and doing it well, no amount of monetary incentive will help him to do it better ; an offer of any such would be an insult to him and would be felt to be so. It may distract him into working more quickly but it is certain that the quality of his work or the pride in his craft would suffer, and just as certain that if he allowed himself to be attracted by the monetary incentive, it would eventually take the place of any direct interest he had once possessed in the efficiency of his work. The dignity of the craftsman would have given place to the indignity of the mere wage-getter.

IMPORTANCE OF APPRECIATION Men may be rewarded by a bonus, by profit sharing, by increases in their wages, and providing that it is a reward in recognition of good work done, its rightness cannot be disputed. Such action would almost certainly result in continued good work and even improvement in quality and quantity, but that can only come from a perfect reciprocal understanding and by appreciation on both sides.

A man wants to feel that he is earning his just due and likes to feel that he is earning just appreciation. If, however, in place of that he is promised extra money to work harder or better, it is exactly equivalent to telling him that he is not working as well as he may, that we do not trust him to do so, and that we do trust him to do for extra money what we believe he will not do for his just reward. If, then, we want his best we can only get it by appreciation expressed in whatever way we may deem fit.

That is the case as affecting the conscientious craftsman.

We have, on the other extreme, the unconscientious worker, and here is a different problem. The man who has a routine job and is conscientious in doing it is in exactly the same category as the conscientious craftsman, although his work may be more monotonous. He will respond to appreciation in whatever form expressed. The unconscientious worker cannot possibly become more conscientious by the attraction of extra money for better and harder work. Surely it is foolish to think so. The only real treatment for this man is good supervision and nothing can take its place. To pay him a monetary incentive instead of providing the necessary supervision is merely inviting his discontent if he does not get the monetary incentive.

If we are honest with ourselves we must admit that monetary incentive has been and always will be a miserable substitute for something which is more difficult to give and more valuable by far, appreciation, understanding, and diligent supervision. We have offered a monetary incentive because we have believed that it would relieve us of those three requirements so that we could sit back and trust to its influence. We have reaped what we have sown, and a poor harvest it is.

In adopting the policy of monetary incentive we sometimes shut our eyes to the actual increase in inspection costs, scrapped work, and reclamation of bad work made inevitable. We often do this by including such costs in our overhead load.

How soon may we get down to a just wage for every man and exert the difficult but worthwhile influence of appreciation and diligent supervision?

Workers and employers would all gain by a change in the system of payment and it is questionable if anything would be lost by reverting to a set wage, the amount of which would depend simply on the quality of the earner. The incentive would then be the quality of workmanship and output would depend upon the quality of supervision and the ability of the worker to keep his job by virtue of his diligence and his merits. Production Engineering needs simplification and not complication.

How many wage-earners would not gladly once and for all compute all the additions, bonuses, allowances and deductions to which they are entitled, or for which they are liable, and settle to a steady wage week by week, to say nothing of the saving in clerical time which would be effected. Once settled, they could count their wages to see that they were right and could then forget them. The quality of their work, the amount they could produce, and the satisfying of their employer would be their incentives. The responsibility of losing their jobs, or losing the appraisal of their colleagues if not satisfactory, would be a deterrent to sloth or inefficiency.

RATEFIXING The systems of payments based on ratefixing had another reason for their introduction, and that was to enable employers to estimate accurately the factory cost of an article. Today the bottom is knocked out of that reason; the estimator can only guess what the actual cost is likely to be. In the present state of flux, how many estimates hold good for twelve months or even six months?

Apart from that, however, new models required in moderate quantity, if handled on the quantity production system, entail a certain amount of training of operators and, up to the time when they can be said to be trained, errors in their work will have to be done over again. Inspection has to be augmented and supervision sharpened, which means that overheads run high. By the time that has steadied down, the batch is completed.

If, for such work, a set wage was paid and the work carried through as a straight contract, some possible extra labour time showing up may be cancelled out by the saving in time and cost in preparing for the run, and in hidden expenses in carrying it through.

If the real actual cost of carrying through a batch of work under

a quantity production system could be compared with the actual cost of the same batch made in a section, well planned with all the advantages of our present knowledge, it would be surprising if the quantity production system showed any real gain.

In speaking of systems we have in mind not the decent orderly setting out of work for production, which makes all the difference between its being carried through successfully or with waste of time and material, but what we know as routine. The history of modern routine is in line with the history of modern production and is based on quantity production, it has in fact been nurtured on quantity production and, in consequence, has become a menace to anything but that.

We have become so enamoured of quantity production systems that large and small factories alike have come to imagine that without it they are out of date and inefficient. Nothing has been more attractive than to secure a man, often an American, whose special duty has been to systematise production and indeed to try to bring it to the standard of American efficiency. We have learned much by these experiences and let no one grumble at the American, he has taught us much. We have paid heavily for our own course of action and would probably have paid heavier if we had not acquired the knowledge. Yet, at the present time, we are so wedded to quantity production formulae that we cannot efficiently cope with what is ours by nature, by geographical position and by economic necessity.

Ours is a small country with great influence; we are by nature a tolerant people, a peculiar people, and cannot easily credit that any merit of our own should place us in the forefront in competition with others. We are always ready to believe that the other fellow is as good if not better, and it is largely due to that trait that we so quickly seek and absorb advice from him. That is well, and we learn by it. We are so placed as to be interdependent with other peoples for success in commerce, which broadens our outlook to intense world interest. Our economic position since the wars involves shortage of many materials.

It therefore behoves us to put into the little we have the best we can, and, instead of using much material to make many cheap commodities, attention should be directed to the fewer commodities of greater value. If we would but do this, the Commonwealth, America, and other countries would buy from us.

We have, therefore, to apply quantity production, as such, in its appropriate sphere, but to set ourselves to batch and smaller quantity manufacture as a definite target, employing all the craftsmanship we can command and attract to our factories, educating and training new talent as quickly and well as possible. We must remember, too, to reward it, and then an influx would be guaranteed.

Large organisations may do well to separate their systems, one applicable to large quantity production and another specifically designed to cater for small quantity production on efficient lines. The latter may involve separate self-contained sections which would operate through or apart from the other at will, which can design, purchase, plan, pay wages, and sell independently or interdependently.

If we examine the functions of the quantity production system mentioned earlier, we shall see that much of it can be modified and simplified gainfully when handling batch quantities.

Process Layout—is very necessary and involves the efficient flow of the work. The Process Engineer would be attached to the Section and would be on the spot throughout the work.

Ratefixing—can be eliminated entirely by paying straight time with good supervision.

Estimating—should incorporate the function of ratefixing by estimating the times for the operations laid down by the Process Sheets.

Planning—is simplified by routing the complete job, or, if required, the units comprising that to the appropriate Section which will handle the entire business.

Shop orders—eliminated.

Orders for materials—handled by the Section.

Tool Design, Manufacture and Tryout—the Process Engineer would regulate the tool design and would progress the work through to tryout and the making or ordering of parts from the tools, and the making of assemblies which would be in the Section.

Stores Inspection and Control—would function normally, but stores would be routed direct or in batches to the Section, as required by the Supervisor.

Progressing—would be the responsibility of the Section.

Inspection—inspection of parts made in the Section and Assembly Inspection would be covered by the Section and it would differ from the normal Line Inspection by an important detail: the Inspector would himself put right anything that he found wrong where practicable, notifying the Supervisor verbally to avoid recurrence. Only in continuous line production is it economical to inspect, reject, and shunt work to rectification.

Accounting—would be effected within the Section under the control of the Chief Accountant. Being on the spot, it would provide the Manager of the Section with what he needs *in time*, enabling him to control expenditure and credits. No bonus incentive would be given to the Manager or others. They should

be suitably rewarded on results, not by promises but by increases of salary, wage or status. The difference is a dignity which cannot be achieved by monetary incentive.

DEFEATING MONOTONY If we think to eliminate monotony from the lot of the human being, we are super-optimists, but that is no reason why we should not take every step in our power to reduce it to a minimum and, where it cannot be avoided, to adopt counter-measures to relieve it as much as possible.

The disease needs to be understood in itself and carefully diagnosed in relation to its effect upon human nature before proper treatment can be prescribed. Attempting then a definition, we might describe monotony as a condition of mind brought about by repetition of movement, or the use of one of the five senses to such an extent that the mind tires or becomes dormant.

Its effect upon human nature is dependent upon its degree and on the nature of the person affected. Everyone possessed of discipline or self-control has to take a share of monotony. It is usual for a man to shave daily, for a woman to wash up after a meal, and the tasks affect persons in two ways. Either they tire the mind to the extent of taxing self-discipline, or else the task becomes a habit, in which case the mind is not, or is very little, employed upon it. The degree to which a task is undertaken or imposed may of course result in physical and therefore mental fatigue.

It is important then, in setting out work for persons to perform, to study the number of times the task must be performed within a given period, and to consider the type of person required to perform it. If it is clearly monotonous and will tire the operator, it is worse than useless to depend upon an incentive bonus or any such means to encourage or oblige him to work quickly and well. Counter-measures must be devised to relieve and offset the monotony. These may take the form of frequent relief operators or the combination of other operations with the repetition one in order to break the monotony. Often better efficiency can be effected by combining operations than by the prevalent urge to break them down.

The choice of persons for such tasks should take into account ability readily to turn the performance of the task into a habit; temperamental outlook, degree of ambition or contentment, and the proximity of other interests to divert the mind from entire concentration.

One of the greatest incentives to the efficient performance of any work is a vivid appreciation of the greater of which it is part. That is a true statement for every human work, however small or however great, is but part of a greater. No effort should be

spared therefore to acquaint an operator with the following stages of the work towards which he is contributing, and to win his interest in those stages up to one as high as he is able to appreciate. Human nature will respond to this, and, instead of a drove of slaves to a system, we shall breed a team of men.

We are aware that some of the thoughts expressed will be difficult of assimilation to many absorbed in the trend of the present day, but we are pointing to the day which is dawning and not to the age as it is.

Nevertheless we are not thinking loosely for already we are witnessing the breakdown of many systems, in particular of the monetary system, the root and basis of a colossal growth of evil.

We shall witness the confusion of finance and world economy. Better by far to plan now on sound basic principles, above all respecting the sanctity of the human being.

Notes

Notes

Notes



By Using

FERROMIDE
REGD.

PRODUCTION PROVED PRODUCTS
SOC

ELECTROLYTE WORKS, 9A, LADBROKE GROVE, LONDON, W.11
PHONE: PARK 6564-6969 # GRAMS' SUNANTICOR, PHONE, LONDON

WRITE FOR ILLUSTRATED LITERATURE
SPECIALISTS IN INTERMEDIATE METAL PROCESSING

J.P.E.S

The Sykes organisation are pleased to announce
their appointment as sole British Agents for

KLINGELNBERG

MACHINES and EQUIPMENT

Spiral Bevel Gear Hobbers

Straight Bevel Gear Hobbers

Gear Wheel Lapping Machines

Worm Grinding Machines

Gear Quenching Presses

Gear Testing Equipment

AUTOMATIC HOB SHARPENING MACHINES

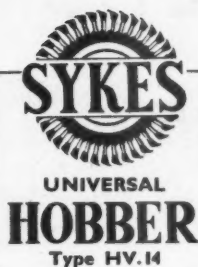
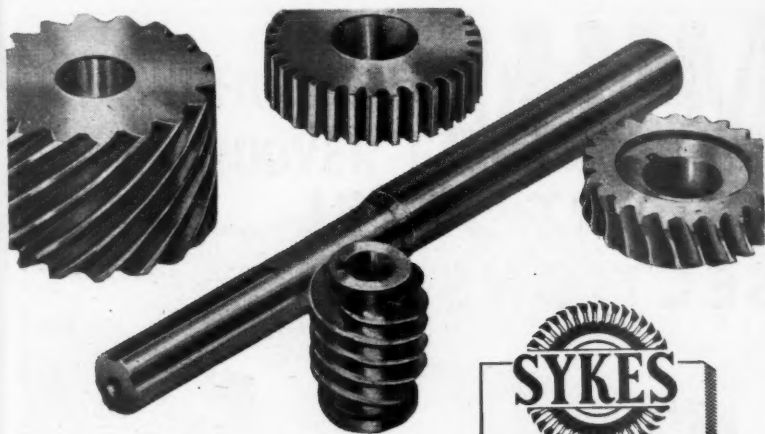
With completely automatic cycle and positive indexing to ensure the greatest possible accuracy of pitch, the Klingelberg Automatic Hob Sharpening Machine is ideal for hobs up to 11 $\frac{3}{4}$ inches diameter.

A range of testing equipment is available for speedily and accurately checking the work.

Full particulars and specifications from :-

W. E. SYKES LTD.,
STAINES - MIDDLESEX - ENGLAND
Phone : Staines 978/9 Grams : "Sykutter Staines"





A multi-purpose Machine for General Work

Where a varied range of work is handled, profits depend on flexibility of Equipment and ease of set-up.

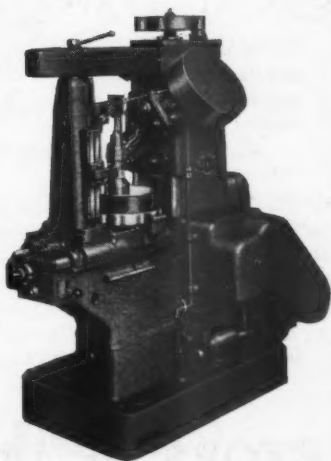
The Sykes Universal Hobbing Machine is designed for the economical production of Spur Gears, right and left hand Helicals, Worms and Wormwheels, Chain Sprockets, Splines, Serrations and similar forms, to extremely close limits.

The great flexibility of this Machine in no way impairs its capacity to maintain high output on long production runs.

Ready accessibility of Change Gears for indexing, lead and feed and the provision of vernier scales on work saddle and hob carriage make set-up extremely simple.

For gears up to 14" diameter.

*Technical description and specification
sent on request.*



W. E. SYKES LTD. STAINES • MIDDLESEX

Phone : STAINES 978-9

Grams : "SYKUTTER, STAINES"

MILLS

BRIGHT STEEL SECTIONS

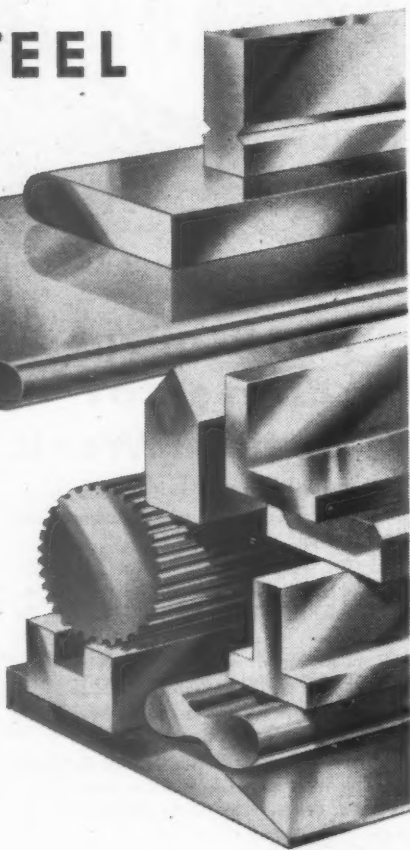
TOOLS AVAILABLE
FOR OVER 1,600
SPECIAL SHAPES

All our special shaped bars are bright smooth finish, accurate to drawing, and to required limits.

Eliminate the need for machining from the solid, save steel, and help to speed up production.

Sections can be produced to customers' requirements in approved quantities.

Please ask for our Special Sections Catalogue.



EXORS OF JAMES MILLS LTD

BREDBURY STEEL WORKS AND ROLLING MILLS

WOODLEY · Near STOCKPORT · ENGLAND

TELEPHONE: WOODLEY 2231 (10 LINES)

TELEGRAMS: "MILLS" PHONE WOODLEY

MANUFACTURERS WELCOME NEW HOOVER F.H.P. MOTOR



The new Hoover
motor to B.S.S. 170/1939
in drip-proof and totally
enclosed frames.

*Practically constructed for ready use in a
wide range of equipment*

IN EVERY SECTION of industry, manufacturers are welcoming the new Hoover F.H.P. Electric Motor. Prices are extremely competitive, and the motors are highly efficient and absolutely dependable. This is not their only ad-

vantage. They are backed by the Hoover Five Point Service Plan, which provides full facilities for both service and advice for users throughout the whole country. Full information will be supplied on request to :—

HOOVER LIMITED

INDUSTRIAL PRODUCTS DEPARTMENT
CAMBUSLANG • LANARKSHIRE • SCOTLAND

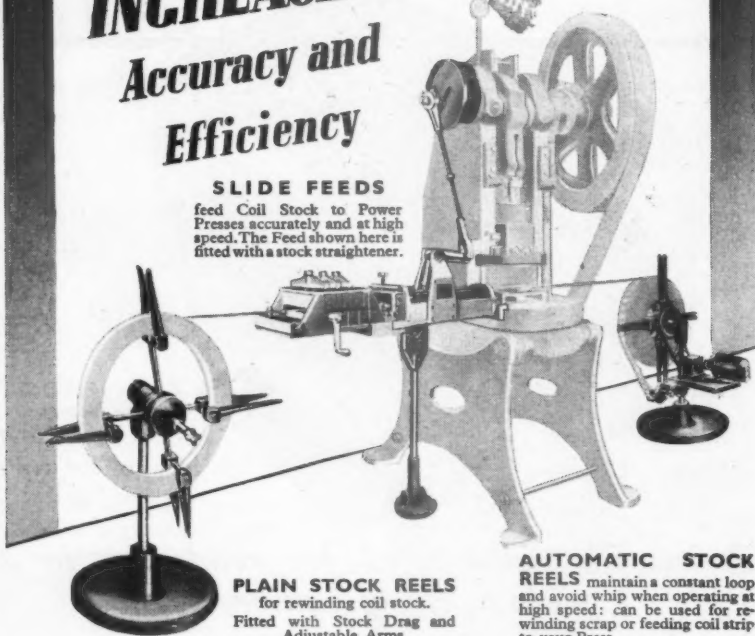
British "U.S. Tool Co." Press Room Equipment

INCREASE stamping speed

Accuracy and Efficiency

SLIDE FEEDS

feed Coil Stock to Power Presses accurately and at high speed. The Feed shown here is fitted with a stock straightener.

**PLAIN STOCK REELS**

for rewinding coil stock.
Fitted with Stock Drag and Adjustable Arms.

AUTOMATIC STOCK

REELS maintain a constant loop and avoid whip when operating at high speed: can be used for re-winding scrap or feeding coil strip to your Press.

Feeds are supplied, complete with fittings to suit your Press.

Write for illustrated leaflet describing Feeds, Reels, Straighteners, Coil Cradles and other time and money saving Press production aids.

Slide Feed and Coil Holder will convert your Press into an automatic machine producing at every stroke. Positive stops ensure accurate feeding.

ROCKWELL
MACHINE TOOL CO. LTD.

WELSH HARP, EDGWARE ROAD, LONDON, N.W.2 'PHONE: GLADSTONE 0033

- B.S.A. TOOLS LIMITED -

TRADE MARK
B.S.A.

... latest addition to the range

BROACHES

B.S.A. Tools Limited, produce Broaches for use throughout the Engineering Industry

Made from specially selected steel, scientifically heat-treated, precision ground, B.S.A. Broaches are designed to provide an exceptionally fine finish to a high degree of accuracy. Particular attention is devoted to the elimination of distortion, to heat dissipation and ability to withstand excessive wear.

Extreme left is the largest high-speed steel Spline Broach made in England, to date. This is one of a set of three B.S.A. Broaches for machining bronze clutch housings. Length of broach-57 in. Dia. 6 1/8 in. No. of splines 10. Weight 580 lbs.

By way of contrast a 0.05 in. dia. broach, 2 in. long, has also been made by B.S.A. Tools Limited.

Customers' requirements in accuracy, finish and production are carefully considered by B.S.A. Broach Specialists. They are anxious to assist in the solving of your broaching problems.

B.S.A. TOOLS LTD.

BIRMINGHAM, ENGLAND

Sole Agents in Gt. Britain:

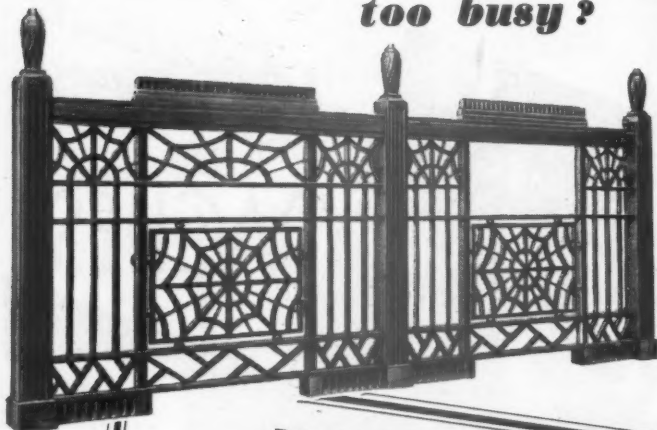
BURTON, GRIFFITHS & CO., LTD.,

FACTORS OF HIGH CLASS MACHINE & SMALL TOOLS. SMALL TOOLS DIVISION:

MONTGOMERY STREET, SPARKBROOK, BIRMINGHAM, 11. TELEPHONE: VICTORIA 2351/9

BRANCHES: LONDON · MANCHESTER · LEEDS · BRISTOL · NOTTINGHAM · GLASGOW · BELFAST

Is your machine shop too busy ?



A designer can make an awful lot of work for the machines—or he can use more McKechnie brass and bronze extrusions. In this beautiful example of metal work, James Gibbons Ltd., of Wolverhampton utilise bronze bar to obvious advantage. You can use it equally well in a marine pump, an electric fuse or a window frame. In so doing you invariably cut down machining time.

McKECHNIE BROTHERS LIMITED

Metal Works: Rotton Park Street, Birmingham, 16.

Branch Offices: London, Leeds, Manchester, Newcastle-on-Tyne.

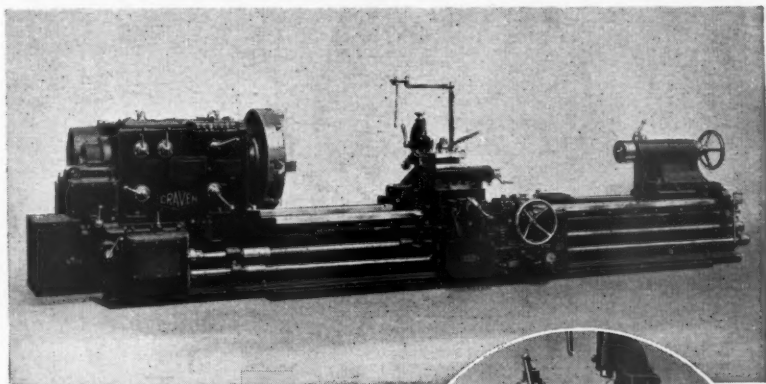
Copper Sulphate and Lithopone Works: Widnes, Lancs.

South African Works: McKechnie Brothers S.A. (Pty) Ltd., P.O. Box No. 382, Germiston, S.A.



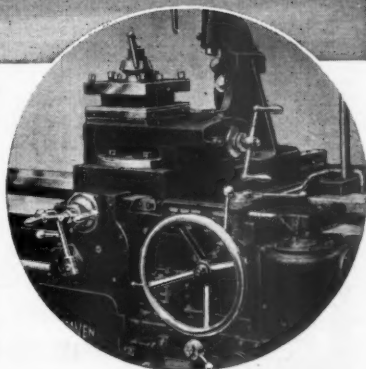
CRAVEN *High Speed* **HEAVY DUTY LATHES**

OF ALL TYPES FROM 16" TO 100" CENTRES



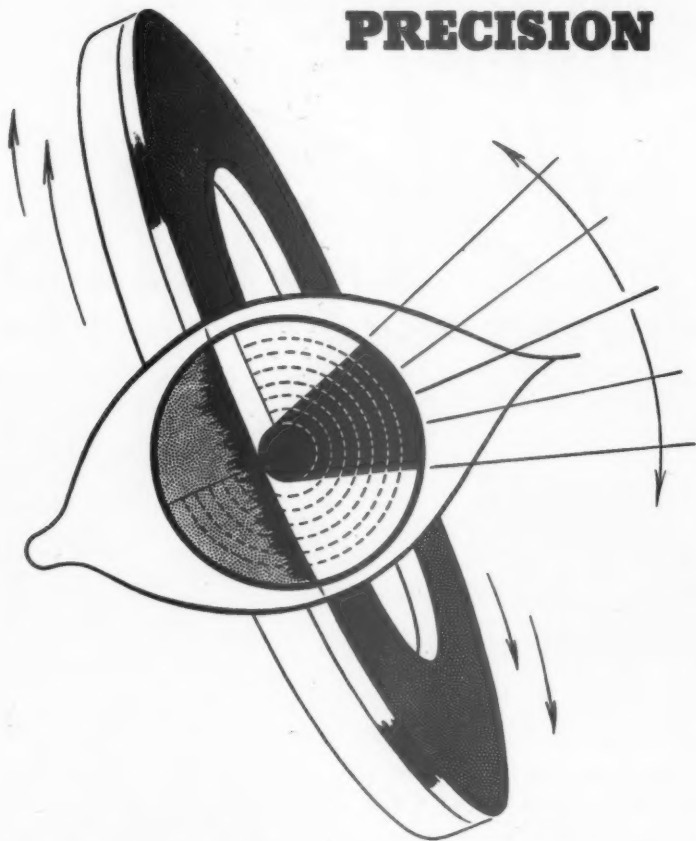
"CRAVEN" 16" CENTRES SUPER HIGH SPEED LATHE

A high-production lathe for the modern cutting tool. Spindle speeds range from 4 to 400 r.p.m. and the headstock is fitted throughout with ball and roller journals. Screwcutting is standard, coning by gearing and taper turning by tangent bar are supplied to order.



CRAVEN BROTHERS (Manchester) LIMITED
VAUXHALL WORKS REDDISH STOCKPORT

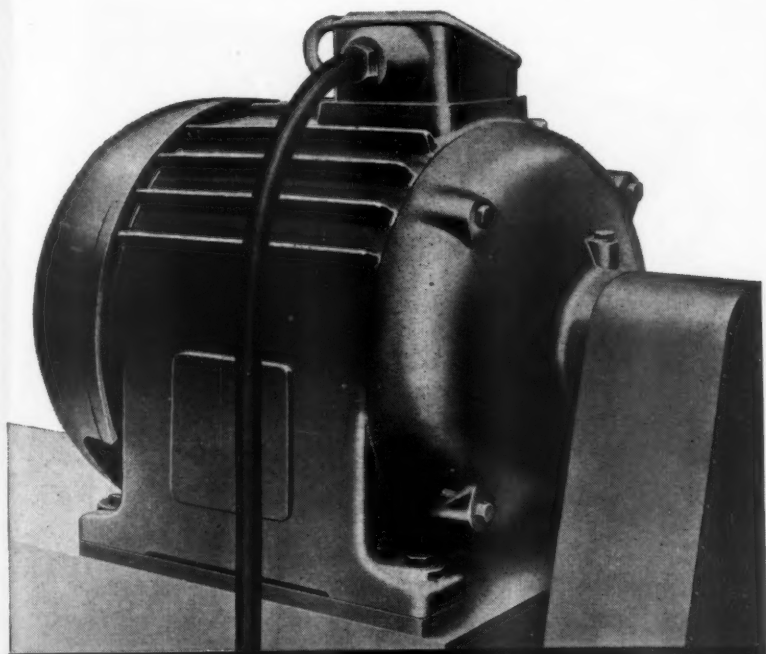
PRECISION



Diatipt Chisel Truers are precision ground under optical control. We show diagrammatically the operator's view through the microscope.



DIATIPT WORKS • NORTH CIRCULAR ROAD • LONDON NW2 • GLADSTONE 8221



there is an

**'ENGLISH ELECTRIC'
MOTOR**



for every industrial drive

The ENGLISH ELECTRIC Company Limited

INDUSTRIAL MOTOR WORKS . . . BRADFORD

Works also at STAFFORD . PRESTON . RUGBY . LIVERPOOL



Duckham's produce a range of water soluble and neat cutting oils, which efficiently and at a minimum cost meet the demands of all machining operations. Duckham's technical service staff is always ready to help with difficult problems such as those arising from broaching, thread grinding and gear cutting.

"Duckham's Cutting Fluids" — a booklet giving full details and many useful reference tables — will be sent free on request.

Duckham's

MACHINE SHOP LUBRICANTS

ALEXANDER DUCKHAM & CO. LTD., 348 KENSINGTON HIGH STREET, LONDON, W.14

Tel : WESTern 8271



LIKE a juggler on a flying trapeze, the Cincinnati Centreless Grinder can perform amazingly versatile feats of precision work. Its range can cover an astonishing variety of articles: glass bottle stoppers and bath tub fixtures, bowling balls and gudgeon pins, wringer rollers and fountain pen bodies, pistons, pinions, drills, hammer heads and a host of others of almost any shape you can think of in all kinds of materials; metal, glass, plastic, fibre, hardwood, rubber, composition. In fact the full story of the versatility of the Centreless makes you dizzy. But it's worth reading in the Brochures on the Nos. 2 and 3.

Additional applications of the No. 3 Centreless include such parts as rear axle housings and, with "Long Bar Equipment", bars up to 18 feet long.

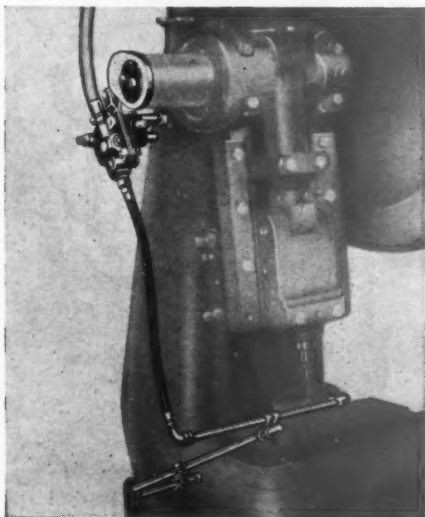
CINCINNATI Centreless Grinders



CINCINNATI MILLING MACHINES LIMITED,
TYBURN, BIRMINGHAM, 24

COMPRESSED AIR

will give you "extra hands"



Hand operations may set the speed of a machine's output, a limiting factor so often unnecessary. With a Schrader Ejection Set fitted, compressed air is *used* to eject small parts much more efficiently than will an operator's fingers. The air blast is synchronised with the cycle of operations of the machine giving maximum efficiency without waste of air. Schrader equipment gives you "extra hands" from your air line.

Schrader

AIR CONTROL EQUIPMENT

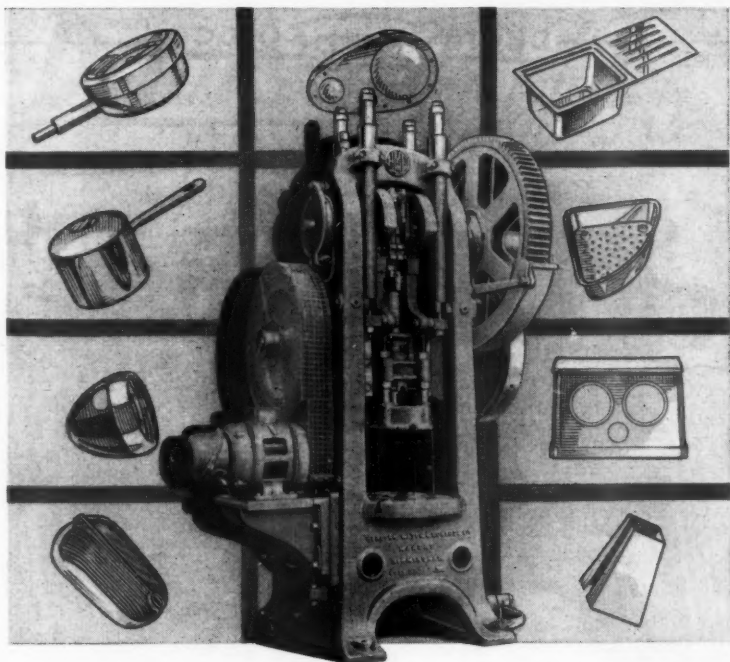
To A. SCHRADER'S SON (Division of
Scovill Manufacturing Co.) 829 TYBURN
RD., ERDINGTON, BIRMINGHAM, 24
Please send details of Schrader Ejection
Sets and Air Control Equipment.

NAME.....

ADDRESS.....

SEND FOR DETAILS TODAY

.....J.E/5



A Pressing Improvement

You can immediately improve both the quality and the quantity of your pressings by installing the right Press for the right job. The variety gives you an unrivalled choice within the capacity of 3 to 300 tons.

Write today for our latest Catalogue

Our Technical Representative is ready to call at any time to suit your convenience.

Excellent deliveries now available on a number of types. Please ask for details.

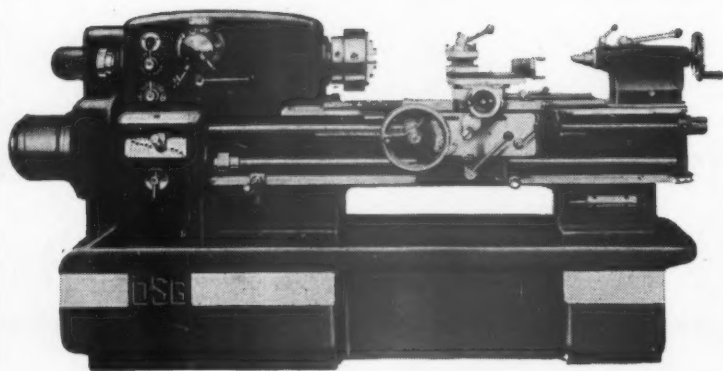


HORDERN, MASON & EDWARDS LTD

PIPE HAYES, BIRMINGHAM, 24, ENGLAND. Telephone: ASHfield 1104 (7 lines) Telegrams: "Aitchemmer" B'ham
LONDON OFFICE - 4, VERNON PLACE, SOUTHAMPTON ROW, W.C.1 Telephone - HOLborn 1124

Dean Smith & Grace

LIMITED



TYPE 13 LATHE

13" Swing Precision Lathe.
 Flanged Vee Belt Drive.
 Self-Adjusting Clutch.
 Middle Bearing to Spindle.
 Final Drive to Spindle by Vee Belts.
 Patent "Fastlock" Spindle Nose.
 Wide Range of Spindle Speeds, and
 Threads.

KEIGHLEY



ENGLAND

Dawson *Metal Parts*

CLEANING & DEGREASING MACHINES



Extract from "The Factory Manager"

A bad bottleneck was cleared by the installation of Dawson washing plant for cleaning all components in process. Working a three-man team on day and night shift they found the paraffin spray-booth system inefficient, and unhealthy, there was, moreover, frequently a backlog of work piling up. The Dawson washers are expensive, but the savings they effect are remarkable. The night shift has been eliminated on this job; degreasing, hot rinsing and drying of a components manufactured on both shifts is now completed by day. The backlog was cleaned up by one machine on the first day of installation. Saving of time is conservatively estimated at 200 per cent on this 'mucky' but essential operation.

Manufactured by
DAWSON BROS. LTD., GOMERSAL, LEEDS

Sole Distributors & Consultants
DRUMMOND-ASQUITH (SALES) LTD
KING EDWARD HOUSE, NEW ST., BIRMINGHAM

Telephone : MIDLAND 3431-2-3



G.P.A. TOOLS & GAUGES LIMITED

HARPER ROAD

WYTHENSHAW

MANCHESTER

PHONE WYTHENSHAW 2215.

GRAMS PNEUTOOLS, PHONE

*We can now
accept your enquiries
for*

JIGS-FIXTURES & GAUGES

PRESS TOOLS · MOULDS AND
SPECIAL PURPOSE MACHINES

of all kinds



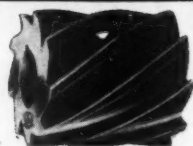
Up-to-date shops specially laid out and equipped for making, on a production basis, every type of precision ground gauges; limit snap, form, calliper, taper and special purpose gauge, as well as jigs and fixtures of all kinds, press tools, moulds and special purpose machines. Highest class workmanship and accuracy guaranteed.

G.P.A. TOOLS & GAUGES LIMITED

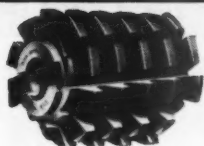
Guaranteed Precision Accuracy

Members of the Gauge & Tool Makers' Association

ENGINEERS SMALL TOOLS



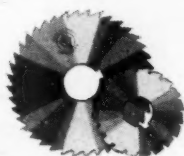
MILLING CUTTERS



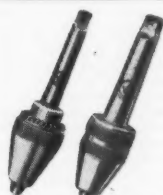
HOBS & FORM CUTTERS



REAMERS & DRILLS



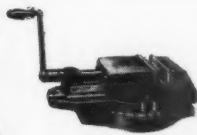
SAWS



DRILL CHUCKS



OIL & SUDS PUMPS



MACHINE VICES



STANDARD AND

"CARDINAL" BLADED MILLING CUTTERS
 "CARDINAL" INSERTED BLADE FACING
 HEADS • "CARDINAL" DRILL CHUCKS 3 JAW
 "CARDINAL" RAPID SLIP DRILL CHUCKS
 "CARDINAL" TAPPING ATTACHMENTS
 "CARDINAL" GEAR PUMPS FOR SUDS &
 OIL • "CARDINAL" MACHINE VICES
 "CARDINAL" COUNTERBORING SETS

SPECIAL TOOLS

HIGH SPEED STEEL MILLING CUTTERS
 INCLUDING SIDE & FACE CUTTERS, FACING
 CUTTERS, SHELL END MILLS, ANGLE CUTTERS,
 HOLLOW MILLS, GEAR CUTTERS, END MILLING
 CUTTERS, HOBS & FORM CUTTERS • REAMERS
 — SOLID & ADJUSTABLE • TWIST DRILLS
 COUNTERBORES, JIGS & FIXTURES

THE BROOKE TOOL

MANUFACTURING COMPANY LIMITED

WARWICK ROAD • GREET BIRMINGHAM 11 • Phone Victoria 2323

FIRTH BROWN

1837-1950

EXPERIENCE & DEVELOPMENT IN HIGHEST QUALITY STEELS OF ALL GRADES

As manufacturers of Alloy Steels for High Duty Firth Brown's contribution to industry is world wide, whether it be steels for engineering, shipbuilding, automobile, aircraft, road and rail transport or for the most minute mechanisms of the precision engineering industries. The illustration shows Cast Steel Pilger Rolls manufactured from Firth Brown's Special Quality of Steel combining wear hardness with great shock resistance.

LIST OF PRODUCTS

*Forgings—Light and Heavy,
for special and general
engineering.*

*Forged Steel Drums, and
Pressure Vessels.*

Hardened Steel Rolls.

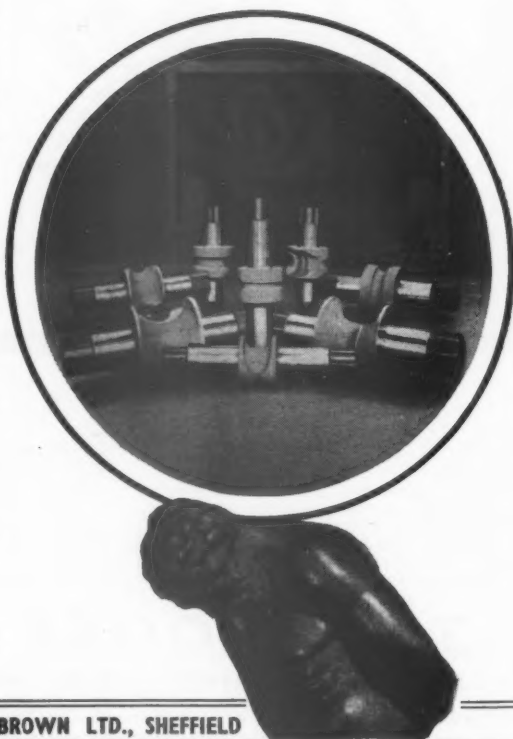
*Carbon and Alloy Steel
Bars and Billets.*

*Tyres and laminated
Springs.*

*High Speed and Tool and
Die Steels.*

Steel Castings.

Write for the Firth Brown
Buyers' Guide for further
particulars.

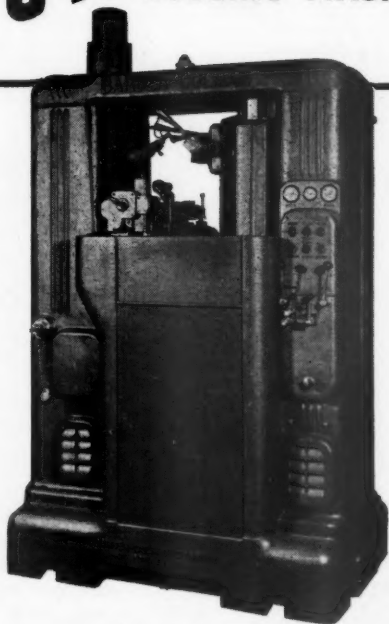


THOS. FIRTH & JOHN BROWN LTD., SHEFFIELD

Introducing the

BARBER-COLMAN No **8-10** *Vertical*
HOBGING MACHINE

This machine, which has a capacity of 8" diameter by 10" long and an outstandingly rugged construction, is designed for high speed production of spur or helical gears or splines. Rigid arch-type casting, extra long vertical ways, which align the work slide, heavy short-coupled drive shafts and broad faced helical and level gearing, provide smooth powerful operation and minimum distortion of machine members even under the heaviest cuts. This extra-heavy structure plus accurate mounting of the hob



on the taper hob spindle, ensures consistent accuracy while the machine maintains a high output, even through day-in day-out operation. Effortless control is provided by the handy centralised panel, from which a lever sets in motion the machine's semi-automatic cycle. A simple selector regulates the 8—10 to either climb or conventional cutting. Increases in hob life ranging up to 50% are achieved by fitting the new Barber-Colman 8—10 Hob Shifter.

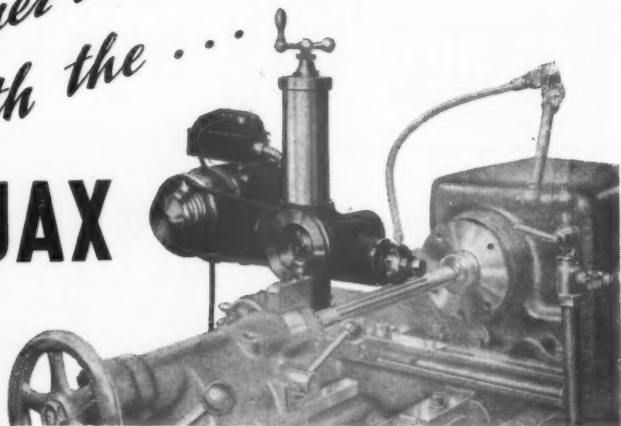
For details write to :

BARBER & COLMAN LTD., MARSLAND RD., BROOKLANDS, MANCHESTER
Telephone : SALE 2277 (3 lines)

Telegrams : "BARCOL" SALE

*Easier done than said!
with the ...*

AJAX



**universal
motorised
machine
tool**

No need to delay doing those urgent jobs of maintenance repair, spare parts, tool making, experimental work and so on. The AJAX Motorised Universal Machine Tool fits quickly on to 6½" and 12" centre lathes, other machine tools or benches, and expeditiously mills, end mills, circular mills, sharpens cutters, cuts spur gears, internal slots and keyways, grinds inside and outside, grinds tapers, threads and splines. All these and numerous other operations to PRECISION LIMITS, using only two interchangeable heads.

*Write at once for details to the
Specialists in Light Machine Tools*



AJAX MACHINE TOOL CO., LTD.
Westmount Works, Halifax, Yorkshire, England.

UNSURPASSED . . . for toolroom and general workshop use. The HARRISON 4½" centre lathe represents even greater value than ever. *ALL* headstock gears are now shaved and higher spindle speeds are available for modern machining methods.

*Available through Leading
Machine Tool Merchants*

★ LEADING
PARTICULARS

Swing over bed
9"

Between centres
24" or 40"

Norton or Three
Speed Gear Box

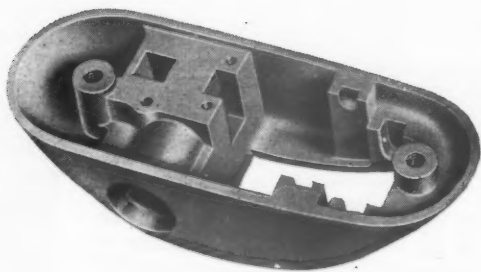


Harrison
4½" CENTRE LATHE

T. S. HARRISON & SONS LTD., UNION WORKS, HECKMONDWYKE, YORKS.

**They're talking
again about
PRESSURE
DIE-CASTINGS**

**This time
it's about
HOUSINGS**

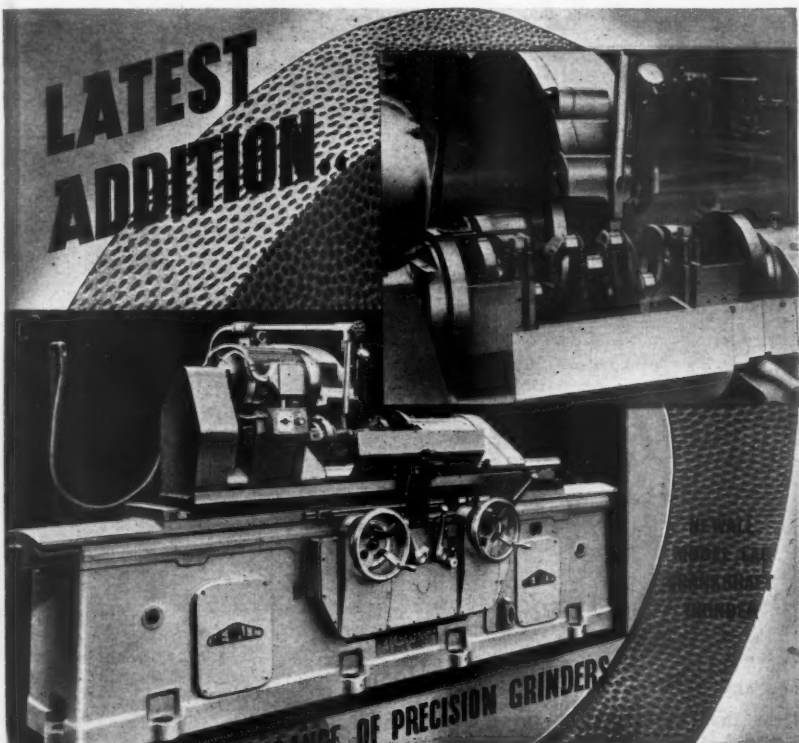


ALL HOLES AND DIMENSIONS CAST TO CLOSE LIMITS WHEN REQUIRED

WOLVERHAMPTON DIE-CASTING CO. LTD.

GRAISELEY HILL WORKS WOLVERHAMPTON.

LATEST ADDITION...



Here is the latest example of British Machine Tool initiative! Features of the LAC Crankshaft Grinder include hydraulically operated wheel head and work steady with single lever control, steady and wheel head feeding simultaneously from opposing sides and pressure lubrication for cubic ways. Models are available covering a wide capacity range. May we forward data?

PRECISION=PRODUCTION . . .

Newall Machines—such as the model illustrated here—by virtue of their exclusive characteristics ensure that components produced are "right from the start". Absolute reliability gives operators full confidence, cuts down "idle time", giving large percentage increases in day to day output.

With Newall the job is right first time. Ask the operator of any Newall Machine—he will tell you!



FULL DETAILS

AVAILABLE FROM

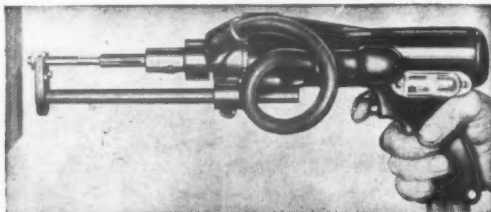
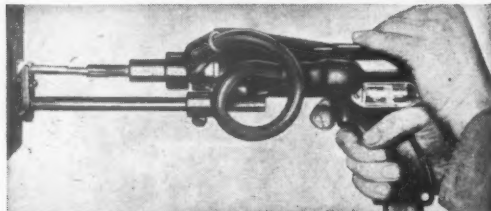
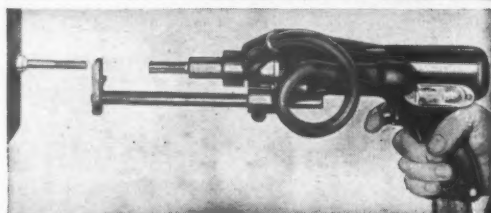
NEWALL GROUP SALES LTD.

PETERBOROUGH • NORTHANTS

PHONE. PETERBOROUGH 3227-8/9

GRAMS. PRECISION PETERBOROUGH

Rathbone

ONE**TWO****THREE***and a stud is fixed*

A few hours' practice with the Nelson stud welder and any operator can fix studs to steel 14 times faster than by drilling and tapping. It can be a standard screwed stud, a plain pin type, shouldered, right angle bend or almost any shape you like. Here is industry's most versatile fixing tool. Wherever you want to fix to ferrous metals, Nelson stud welding can do it, quicker and at lower cost.

NELSON

STUD WELDING SERVICE

CROMPTON PARKINSON LIMITED, CROMPTON HOUSE
ALDWYCH, LONDON, W.C.2.

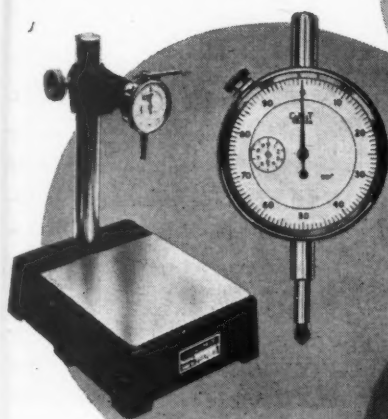
FIVE POINTS ABOUT NELSON STUD WELDING

- * Automatic welding cycle—no welding skill is needed to produce first class welds every time.
- * Easy to operate—just load the gun, place in position and fire.
- * No perforation of parent metal. You can use Nelson studs on vessels such as transformer tanks without impairing gas or oil-tight properties.
- * Nelson studs are designed to ensure a good weld every time. They are end-loaded with flux and sealed over.
- * Equipment comprises Nelson Gun, Automatic Timer and D.C. Welding Generator.

PRODUCTION DEMANDS PRECISION..

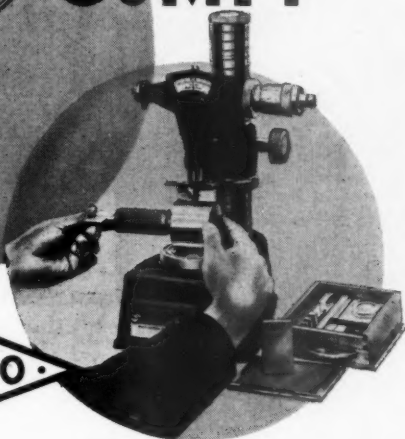
..... and precision must go hand-in-hand with speed. Measuring instruments designed for use in gauging quantity-produced components manufactured to close limits of tolerance, must combine absolute accuracy with simplicity of operation.

Comet and Astco precision measuring instruments have an established reputation for these qualities.



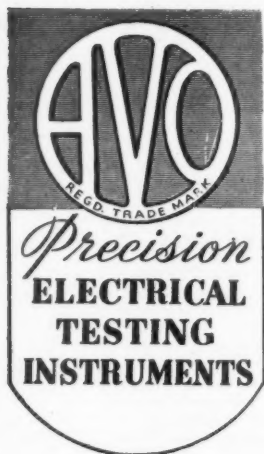
COMET

ASTCO



CHARLES CHURCHILL & CO., LTD
COVENTRY ROAD, SOUTH YARDLEY, BIRMINGHAM, 25

Also at LONDON, MANCHESTER
GLASGOW and NEWCASTLE-ON-TYNE



BRITISH
MADE

£17 : 10s.

Size: 8 ins x 7½ ins x 4½ ins.
Weight: 6½ lbs. (including leads)
Leather Carrying Case available if required.

Sole Proprietors and Manufacturers:

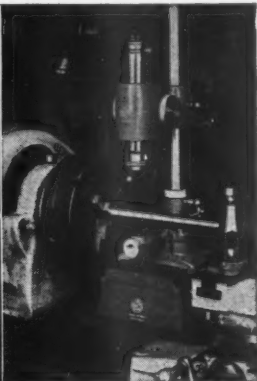
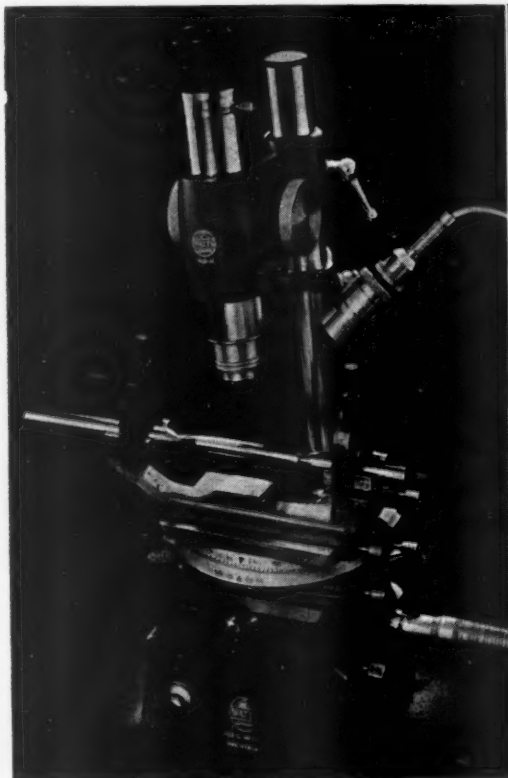
THE AUTOMATIC COIL WINDER & ELECTRICAL EQUIPMENT CO. LTD.
WINDER HOUSE • DOUGLAS STREET • LONDON • S.W.1 Telephone: VICTORIA 3404/9



A multi-range A.C./D.C. Measuring Instrument of B.S. 1st grade accuracy, providing 40 ranges of direct readings on a 5 in. hand-calibrated scale. Range selection is by means of two rotary switches, for A.C. and D.C. respectively. A press-button provides an additional range for each value of current and voltage shown on the switch knobs. The total resistance of the meter is 200,000 ohms. An automatic cut-out provides protection against damage through severe overload.

CURRENT: A.C. and D.C. (0 to 12 amps)
VOLTAGE: A.C. and D.C. (0 to 1200v.
RESISTANCE: Up to 1 megohm.

Fully descriptive literature
available on request.



WATTS

Engineers Universal Microscope

One microscope with a hundred and one uses. Made on the unit principle, it can be built up for the job whether it is simple inspection or measurement by co-ordinates and angles.

Various magnifications, interchangeable graticules.

Write for List JIPE/29 for further details.

HILGER & WATTS LTD.

WATTS DIVISION, 48, Addington Square, London, S.E.5

Telephone: Rodney 5441/9.

Cables: Collimator, London.

Members of the Export Marketing Companies—S.O.I.E.X. and B.E.S.T.E.O.

Selling Agents in Great Britain and Northern Ireland: ALFRED HERBERT LTD., COVENTRY

Blast Cleaning without compressed air!

The Spenstead Airless Rotary Barrel Blast Cleaning Machine does not rely on expensive compressed air plant, the abrasive being projected by a high-speed impeller.



**COMPACT
SIZE**

Occupying very little floor space, this machine is ideal for smaller foundries and engineering works where space is limited. In large foundries it can deal with all the smaller castings, thereby releasing larger machines for heavier work.

**LARGE
OUTPUT**

From four to six 5 cwt. loads can be cleaned in one hour.

**LOW ASSEMBLY
COSTS**

Unit construction cuts down foundation and installation costs.

**EARLY
DELIVERY**

Machines despatched from works within 6 weeks of receipt of order.

Spencer and Halstead Ltd

BRIDGE WORKS OSSETT TEL. OSSETT 353/4

and at Epsom, Surrey. Tel. Epsom 2201 Birmingham. Tel.
Edgbaston 1539 Manchester. Tel. Denton 2934 Glasgow
Tel. Central 5909

PRODUCTIVITY FLASH 10,000 WITHOUT ATTENTION



**FLASH REMOVED FROM
9,564 CRANKSHAFTS
— STILL GOING STRONG**

Crankshaft Hot Trimming Dies hardfaced with "Stellite" Grade 6 at Messrs. Ambrose Shardlow Ltd., have removed the flash from 9,564 Crankshafts and are still going strong. Can you get anywhere near this figure with the Steel Dies you are at present using?

Write to-day for Leaflet - TD.59.

DELORO  **STELLITE**

CUTTING TOOLS

HARD FACING ALLOYS

DELORO STELLITE LTD., HIGHLANDS ROAD, SHIRLEY, BIRMINGHAM

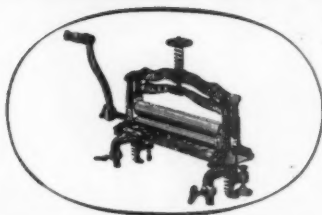
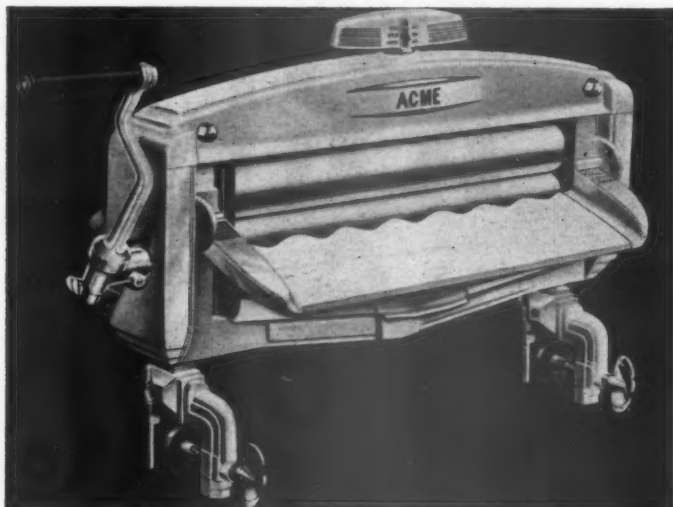
TELEGRAMS. "STELLITE, B'HAM."

TELEPHONE: SOLIHULL 2254-5-6

TIPPED TOOLS

ON CASTINGS

• TOOLBITS • TOOLTIPS • MILLING CUTTER BLADES • HARDFACING ROD • WORKRESTS • PRECISION CASTINGS



ZINC ALLOY DIE CASTING makes all the difference!

No one can doubt that the modern wringer shown above is streets ahead of the old model recalled in the small sketch. Through the sensible adoption of zinc alloy die castings it is easier to work, pleasanter to the eye, and more economical to produce. Zinc alloy die castings are used for the handle, clamps, pressure gauge, mangling board sides and brackets, and also for various nuts and internal fittings.

Compared with cast iron, zinc alloy die casting gives more latitude to the designer, eliminates rusting and provides a choice of more attractive finishes, either by electroplating or enamelling.

Some facts about zinc alloy die casting.

Speed of production is an outstanding feature of the die casting process—the shortest distance between raw material and finished product. Zinc alloys are the most widely used of all metals for die casting because they yield castings with the following qualities:

ACCURACY: Castings can be made practically to finished dimensions and need little or no machining.

STRENGTH: Good mechanical properties for stressed components.

STABILITY: Close tolerances are maintained throughout the life of the casting.

British Standard 1004.

It is essential that alloys conforming to B.S. 1004 should be specified for all applications.

The Association welcomes inquiries about the use of zinc alloy die castings. Publications and a list of Members are available on request.

ZADCA

ZINC ALLOY DIE CASTERS ASSOCIATION

LINCOLN HOUSE, TURL STREET, OXFORD



HERBERT



COVENTRY UNBREAKABLE CHUCKS

- *The strongest chucks made.*
- *Unbreakable by fair use.*
- *Exceptional gripping power and durability. Oil-tight and dirt-proof.*

Construction ensures consistent accuracy. By adjusting the jaws on the slides, the chuck can readily be adapted to hold irregular shapes.

Ten sizes :

6in., 7½in., 9in., 12in., 15in., 18in., 21in., 25in., 28in., 32in.,

Sizes from 6in. to 18in. inclusive are available from stock.

Catalogue on request

ALFRED HERBERT LTD · COVENTRY

SANDING DISCS



A COMPREHENSIVE RANGE OF LINISHER BANDS, ECONOMY ROLLS, CLOTH SHEETS, WET OR DRY PAPER.

STOCKISTS OF "DUREX," "UNION GLUE," "OAKKEYS," "GOLDSWORTHY," ETC.

MONKS & CRANE LTD

THE TWIST DRILL SPECIALISTS

LONDON:

295, EUSTON ROAD, LONDON, N.W.1.
TELEPHONE: EUSTON 5311 (3 LINES)
TELEGRAMS: EMANCEE, LONDON.

BIRMINGHAM:

STANHOPE STREET, BIRMINGHAM, 12.
TELEPHONE: CALTHORPE 3177 (3 LINES)
TELEGRAMS: EMANCEE BIRMINGHAM.

*Reproduced by courtesy of the
Trustees of the Tate Gallery.*



If you want tensile strength

STRENGTH in a pretty tense situation is something you need when there are snakes around. And it's something a metal product or part often needs too. An obvious advantage of MAZAK for the pressure die casting of stressed components is its high tensile strength (18.5 tons per sq. in.).

The basis of MAZAK is 'Crown Special' Zinc of 99.99+% purity, one of the purest metals commercially available.

**DURABILITY
IMPACT STRENGTH
CASTABILITY**

MAZAK

**GOOD FINISH
TENSILE STRENGTH
COMPLEXITY**

IMPERIAL SMELTING

IMPERIAL SMELTING CORPORATION (SALES) LTD.. 37 DOVER ST., LONDON, W.1

is it a headache?

If your particular headache concerns electrical installations, variable speed drives for single or polyphase supplies, automatic control gear or similar equipment

pass it to us

Let us know just what you want and if there is nothing on our list to meet your needs exactly, we will promptly design suitable equipment — just one item of "Electro Dynamic" Service.



ELECTRO DYNAMIC CONSTRUCTION

COMPANY LIMITED

Head Office and Works: ST. MARY CRAY · KENT
BRANCH WORKS: BRIDGWATER · SOMERSET

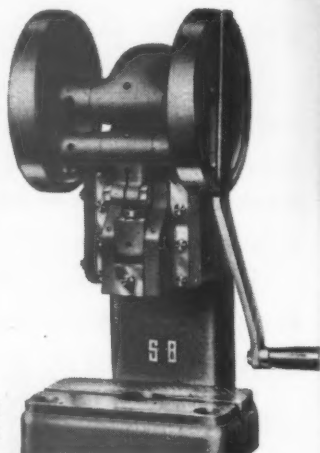
Head Office: 'Phone Orpington 2560-3

Harrogate Office: 11, South Park Road, Yorks · 'Phone: Harrogate 2588
also at Glasgow and Manchester

S&B

Precision TOGGLE PRESS

This economical little press is proving invaluable for all manner of light presswork. The special Toggle Action conserves bench space, lessens operator - fatigue and speeds production.
Available in two sizes: 1 ton and 2 ton capacity.



FULL DATA AVAILABLE
FROM STOCKISTS OR:

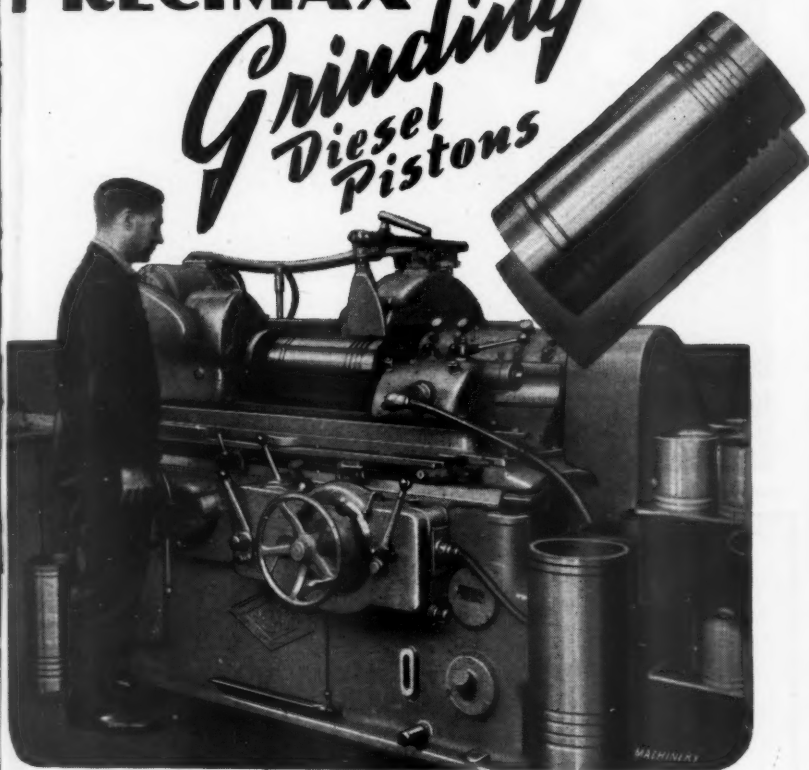


SMART & BROWN (Machine Tools) LTD
SABEL WORKS · BIGGLESWADE · BEDS
(SALES) 24, 25, MANCHESTER SQUARE, LONDON, W.1.
Telephone: Welbeck 7941 (PBX)

Rathbone

PRECIMAX

Grinding Diesel Pistons



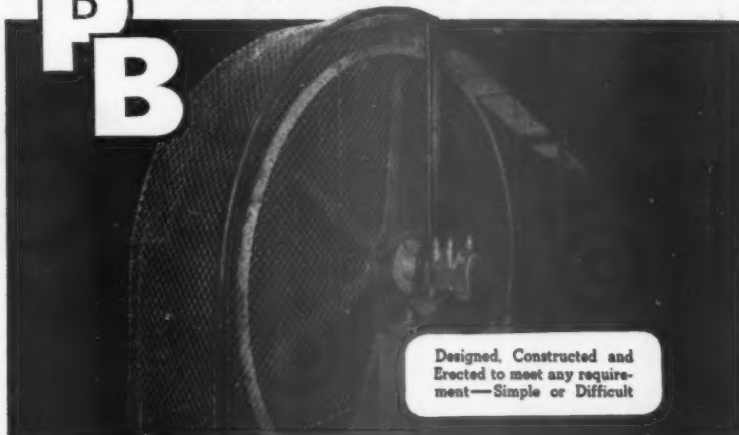
At Hepworth & Grandage Ltd., Bradford, this PRECIMAX M.P.B. 12"×24" plain grinder is meeting all demands for the finishing of cast-iron diesel engine pistons as shown. The pistons, 17½" long by 8½" dia., are ground over the full length, the tapered end being finished by movement of the swivel table.

We build a full range of plain and universal grinders, all convenient and simple to operate, and capable of unusually high rates of output to precise limits. Full details will be sent on request. Please write us.

JOHN LUND, LTD., CROSSHILLS NR. KEIGHLEY

P B

MACHINERY GUARDS



Designed, Constructed and
Erected to meet any require-
ment—Simple or Difficult



PROCTER BROS (Wireworks) LTD

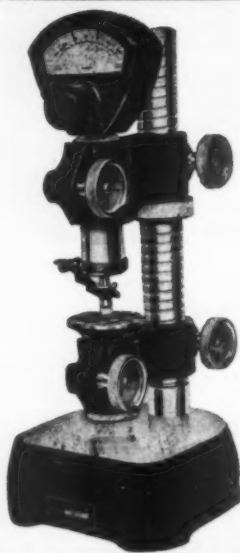
LEEDS
WALES
LONDON

Monkbridge Mills
Castle Works
Salford House

Whitchell Road
Caerphilly
Southampton Row

W.C.I.

Phone - 30551
Phone - 21111
Phone - CRA 8105



DIAL MERCER GAUGES

INSPECTION PRODUCTION

Model 215 Abramson Precimeter Head, mounted on solid stand with coarse and fine adjustment. This head has little friction, combining unparalleled sensitivity on a constant measuring pressure, with a magnification factor far in excess of other mechanical comparators. This head can be supplied alone with a shank of 28 or 30mm.

READINGS:

| | |
|----------|---------|
| .001mm. | .0001" |
| .0005mm. | .00005" |
| .0001mm. | .00001" |

Pressure 4-6 ozs.

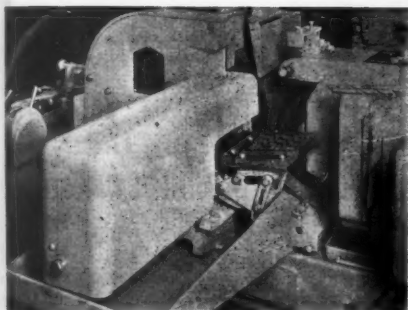
A Complete Catalogue on Request.

THOMAS MERCER LTD
ST. ALBANS ENGLAND

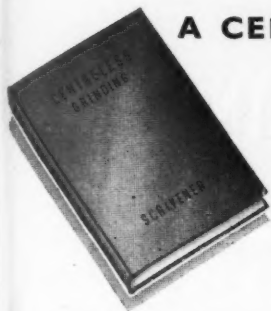
St. Alb 5313-4-5

Est. 1858

Centreless Grind!



Sole Selling Agents for
Great Britain and Ireland:
Alfred Herbert, Ltd.,
Coventry.



A CENTRELESS ENCYCLOPÆDIA

Production engineers interested in accuracy of finish at a low cost will find in the recently issued Vol. 2 of "Centreless Grinding" full particulars of the many types of full-automatic operation which have been developed during the last four years as well as a wealth of data relating to proved and tried practice. It is obtainable upon application to the makers.

ARTHUR SCRIVENER, LTD., BIRMINGHAM, 24

Telephone: ERDington 2274

Telegrams: "Machintool"

It's Cheaper and Better

PITMAN

Sixth Edition

Engineering Economics

Book 2 (Factory Organization & Management)

By T. H. Burnham, B.Sc.Hons. (Lond.), B.Com. (Lond.), etc., and D. H. Bramley, A.M.I.Mech.E., A.M.I.P.E. This is one of PITMAN'S well-known Engineering Degree Series. While particularly recommended for Degree and professional students; it is a useful reference work for others with considerable experience.

15/- net.

"Should prove valuable to those responsible for engineering shop management." — Machinery.

The Factory

By Dr. G. Schlesinger. The outstanding guide to modern methods of equipping, organising and bringing into production every type of factory.

70/- net.

Personnel Management

By C. H. Northcott, M.A. (Sydney), Ph.D. (Columbia). A book by a recognized authority.

Second Edition 18/- net.

Psychology of Human Relations in Industry

By F. Baumgarten. Translated by E. D. Nisbet from the well-known Swiss work.

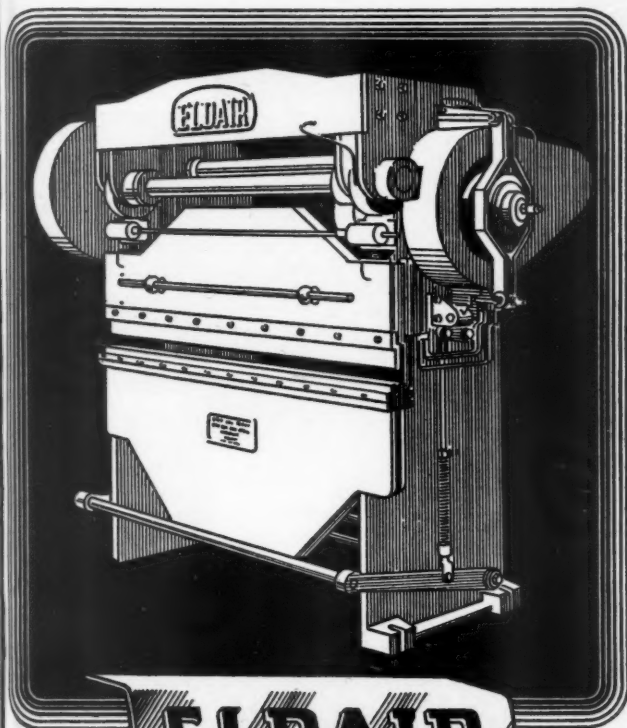
15/- net.

Sir Isaac Pitman & Sons Ltd., Parker Street, Kingsway, London, W.C.2

FLAME HARDENING
 BY THE
SHORTER
PROCESS

We invite you to—
 WRITE FOR
 OUR 32 PAGE
 BOOKLET

FLAME HARDENERS LTD
 "SHORTER WORKS" BAILEY LANE SHEFFIELD.I.
 TEL SHEFFIELD 21627



ELDAIR

PRESS BRAKES



ELDAIR is the last word in medium priced power Metal Bending Machines. It speeds production and lowers the cost, and is essentially a practical precision tool, invaluable to the sheet metal manufacturer.

Sole Selling Agents:

*Remember - WARDS
might have it!*

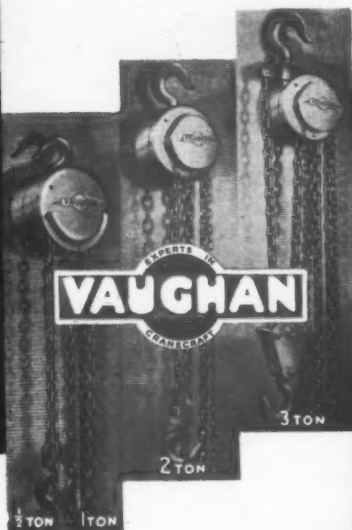
THOS. W. WARD LTD
ALBION WORKS, SHEFFIELD

London Office: BRETTENHAM HOUSE, LANCASTER PLACE, STRAND, W.C.2

Step up
Production
with
VAUGHAN
TRIPLE GEARED
**Pulley
Blocks.**

1/2, 1, 2, 3, 5 TON SIZES

Available for
DISPATCH
IN 10 DAYS
from receipt of order



Type A 47

They're
LIGHTER
to use and carry

STRONGER
to withstand hard wear

CHEAPER
to buy and maintain

VAUGHAN

Cranes, Runways and
Pulley Blocks are
made by

THE
VAUGHAN CRANE CO. LTD.
WEST GORTON
MANCHESTER 12, ENGLAND
Ring
EAST 1473.

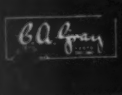
Always Consistent



Please send
for Illustrated Brochures

HORSTMANN Precision
Gauges, Gear Hobs and Fly Press
Guards.

C. A. GRAY Vernier Gauges,
with the Measuring Pressure
Limiting Device, and Internal
Micrometers.



Sole Concessionaires

BROOKS & WALKER LTD.

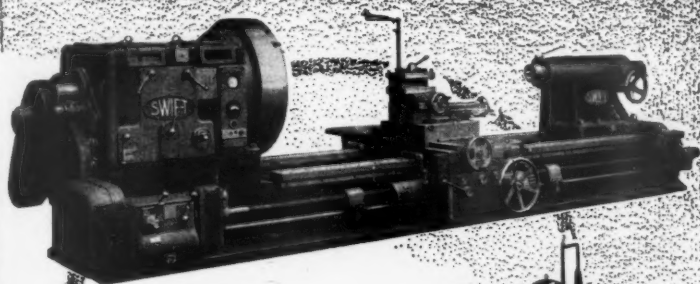
Bermondsey 3535 (15 lines)

41, DOCKHEAD, LONDON, S.E.1

Grams : Brassiness, Boroh, London

HORSTMANN





LATHES



PLANERS

Leadership in Lathes
Perfection in Planers

SWIFT LATHES are built as both Centre Lathes and Surfacing and Boring Lathes, and range from 17in. swing to 72in. swing, with any length desired between centres.

SWIFT-SUMMERSKILL PLANING MACHINES are built from 2ft. 0in. square up to 6ft. 0in. square, of any length of table up to 40ft. 0in., of both Double Column and Openside types, with either all Electric or reversing Two Belt Drive. Special All Electric Feed Motion.

GEO. SWIFT & SON LTD.

CLAREMONT WORKS • HALIFAX • ENGLAND

KERAUNOS
EASIER
DELIVERIES
H.S. HACKSAW BLADES

We have increased our production of High Speed Steel Hack Saw Blades and can now give improved deliveries of all standard sizes.

"Keraunos" Blades cut faster—last longer.

SANDERSON BROS. & NEWBOULD LTD
ATTERCLIFFE STEEL WORKS SHEFFIELD
Steel & Saw Makers for over 170 years

A Clamp with Unlimited Application in Your Plant

CLINO-CLAMP

Unproductive times can be considerably shortened by the use of CLINO-CLAMP standard clamps on all types of Machine Tools. They supersede the improvised packing pieces and holding down fixtures so often used in the machine shop. They are compact, rigid, give a positive grip and owing to very low over-all height they allow maximum clearance for cutting tools.

Six different types of clamp are available and a combination of different types can be used for irregular shaped work.

Fully descriptive folder will be sent on request.

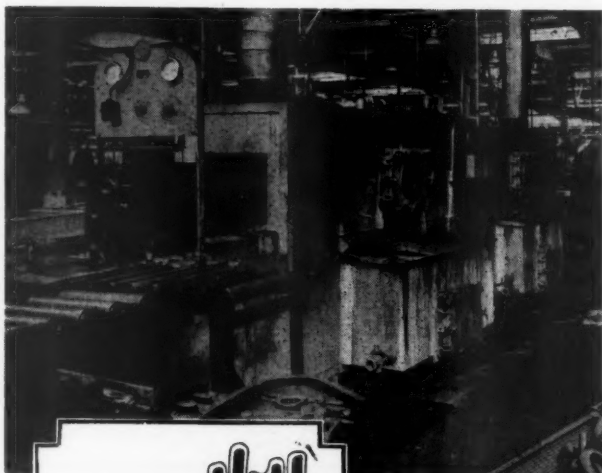
TYPE M.F.L.
TYPE S.K.I.

ADAM

Machine Tool Company Limited

ACHE WORKS WAVERLEY ROAD ST ALBANS HERTS

Each cleaning problem studied individually

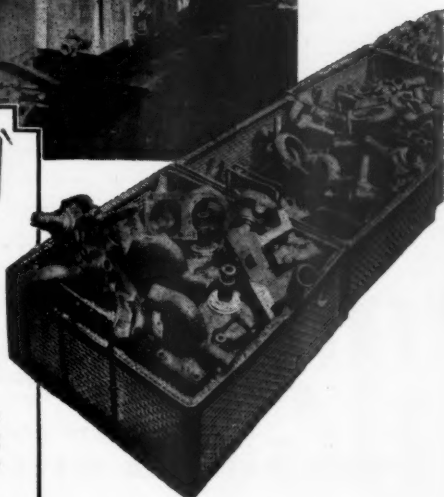


Bratby

INDUSTRIAL CLEANING MACHINES

This illustration shows
a machine cleaning
crank cases in the pro-
duction line.

It is equally capable of
cleaning small parts in
baskets.



Photographs by courtesy of "Machinery."

Sole Agents for Great Britain :

GEO. H. HALES MACHINE TOOL CO. LTD., Victor House, 1, Baker St., LONDON, W.1

Designed and manufactured by :

BRATBY & HINCHLIFFE LTD., SANDFORD STREET, ANCOATS, MANCHESTER 4

FOR RELIABLE METAL CASTINGS

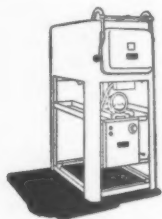
SPECIFY



REGISTERED TRADE MARK

The Technically Controlled Castings Group
18 ADAM STREET, LONDON, W.C.2.

LAKE & ELLIOT, LTD., BRAINTREE · SHOTTON BROS., LTD., OLDBURY
 S. RUSSELL & SONS, LTD., LEICESTER · HENRY WALLWORK & CO., LTD., MANCHESTER
 JOHN WILLIAMS & SONS (CARDIFF) LTD



There are
WILD-BARFIELD ELECTRIC FURNACES
for all heat-treatment purposes

* Illustration shows Self-Contained Horizontal
 Workshop Furnace for temperatures up
 to 1010° C



WILD-BARFIELD ELECTRIC FURNACES LTD.
ELECFURN WORKS, WATFORD BY-PASS, WATFORD, HERTS.
 Telephone: WATFORD 6094 (4 lines) Telegrams & Cables: ELECFURN, WATFORD

CONSTANT H.P. or TORQUE

over a wide speed range

The 'VSG' variable speed transmission gear is highly esteemed by leading engineers. The various advantages solve many transmission problems in a wide range of trades and industries. The chief advantages are:—

1. High torque at low speeds.
2. Quick yet SMOOTH acceleration combined with perfect control in either direction.
3. Ability to "inch" and rotate at very low speeds.

Hand wheel, lever or screw controls can be fitted to suit individual requirements. Write for full particulars.

VSG

Registered Trade Mark

**HYDRAULIC
INFINITELY VARIABLE
SPEED TRANSMISSION**

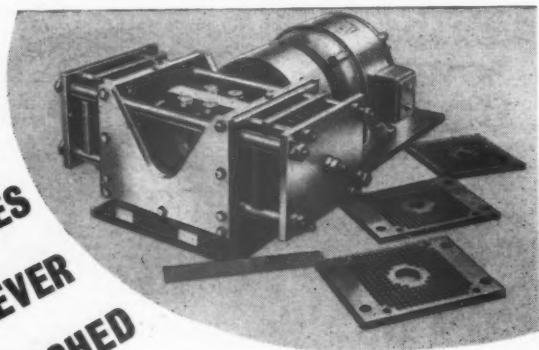
All Enquiries to

VICKERS-ARMSTRONGS LTD

VSG D6

VICKERS HOUSE, BROADWAY, LONDON, S.W.1 Tel. ABBEY 7777

**OUR
FIXTURES
ARE NEVER
SCRATCHED**



We always keep to our dates, whether they apply to Press Tools, Jigs, Fixtures or special purpose machines. Remember, **High Speed Service** means what it says — precisely! Write or phone for us to call:

HIGH SPEED SERVICE TOOL CO. LTD

86 MAPLE ROAD, SURBITON, SURREY. ELMBRIDGE 1135-6

If you require

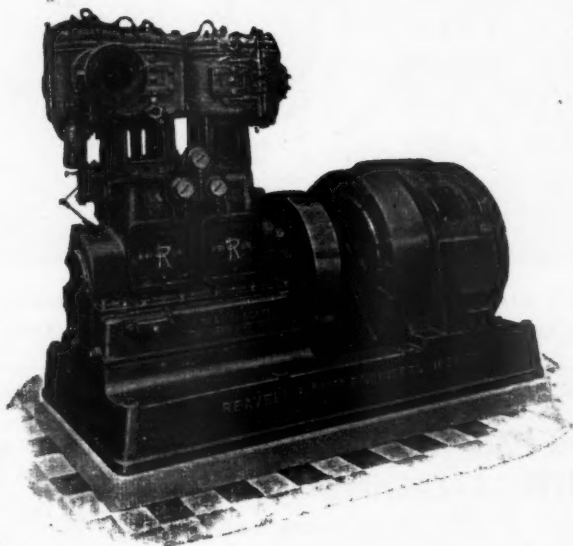
**PRESSURE
DIE CASTINGS
IN MAZAK ZINC BASE ALLOYS**

WE ARE SPECIALISTS
IN DESIGN and PRODUCTION of
PRESSURE CASTINGS

**THE BIRMINGHAM PRESSURE
(E. Hartland) DIECASTING**
75, NEW SUMMER STREET, BIRMINGHAM, 19

Telephone: Aston Cross 2036

AIR COMPRESSORS



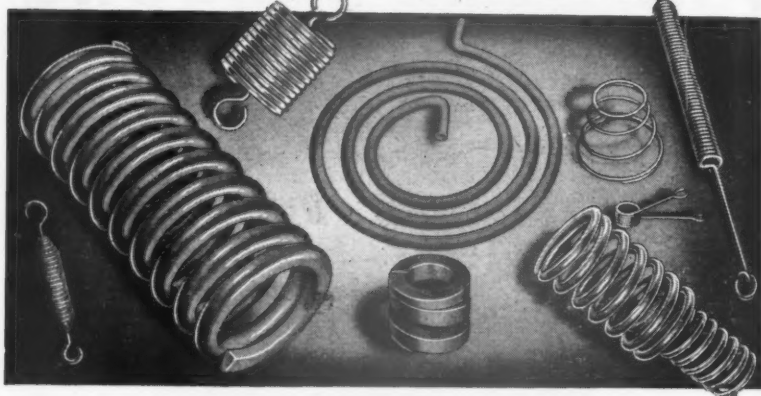
We have standard types for all capacities and pressures and can supply the most efficient and reliable machine for any duty.

REAVELL & CO. LTD. - IPSWICH

Telegrams: "Reavell, Ipswich."

Telephone Nos. 2124-5-6

Springs by RILEY



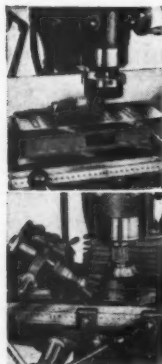
ROBERT RILEY LIMITED
Milkstone Spring Works, Rochdale

EST.
1821

Telephone: Rochdale 2237 (4 lines)
Telegrams: 'Rilospring' Rochdale

THE 'ABWOOD' SURFACE GRINDER WITH ATTACHMENTS

gives surprising results in many types of close limit work
VERSATILITY WITH SIMPLE CONTROLS



The 'Abwood' Surface Grinding Machine is designed to handle the most diverse and the most exacting types of surface grinding, including cutter grinding. It is, in fact, a universal machine for your Tool Room or Production line.

The one machine meets nearly every need. Simplicity of control reduces man hours, cuts production cost.

Sturdily built to close limits with long operational life and low upkeep.

SOME TYPICAL EVERY DAY APPLICATIONS.

1. Regrinding throat of Herbert chaser type Die Head Blades using Herbert special fixture.
2. Regrinding carbide tip angular cutter using diamond wheel and 'ABWOOD' Cutter Grinding Attachment.

Write us. We will gladly give you further information on this specialised machine.



THE ABWOOD TOOL & ENGINEERING CO. LTD., PRINCES ROAD, DARTFORD, KENT
Telephone: Dartford 2258/9

Telegrams: Abwood, Dartford

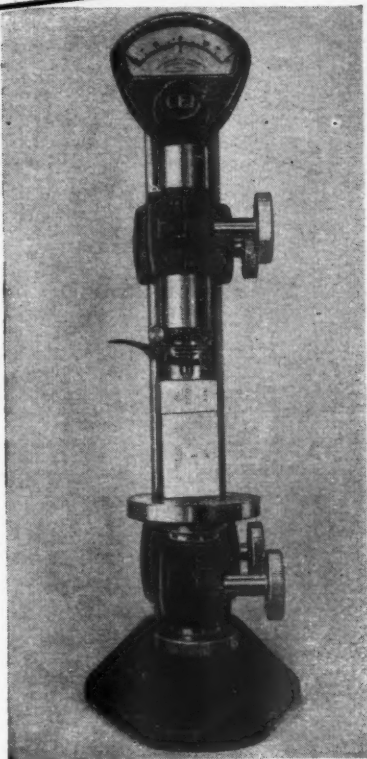
Johansson's

Present the Mikrokator . . .

Early in this century, Carl Edvard Johansson gave to the world, with his precision block gauge, the first practical means of observing a precision standard in normal workshop conditions. To-day, the 'Mikrokator' system of twisted strip mechanical amplification makes a similar contribution to industry. Offering a frictionless, precise to within '000002" and yet extremely rapid method of mechanical comparison, the method can be applied to a multitude of uses. As a comparator, such an instrument is entirely independent of outside sources of energising, but at the same time of small compass, and equally efficient on any inclination.

Standard applications of the method include a precision comparator, extensometer, pressure gauges, a surface finish tester, and micro hardness tester, etc., etc.

If your measuring is presenting any difficulties, we shall be very happy to discuss with you how your problems can be solved by use of the "Johansson Mikrokator".

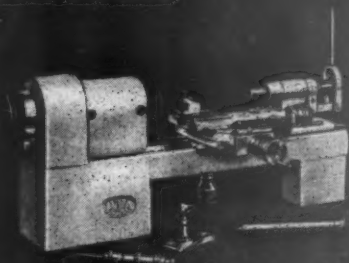


CE Johansson Ltd.
PRECISION TOOLS AND INSTRUMENTS

SOUTHFIELDS ROAD
DUNSTABLE · BEDS.
Tel: DUNstable 422-3

PULTRA MICRO LATHES

- 50 mm. and 90 mm. centre height.
- Very wide range of accessories.
- Ideal for turning, polishing, saw cutting, drilling, milling and grinding of small parts.
- For speeds up to 12,000 r.p.m.



WRITE FOR CATALOGUE



PRESS TOOLS

MOULDS

AND JIGS

Universal Tools LTD

TRAMWAY PATH
MITCHAM
SURREY

Phone: Mitcham 1624-5-6.

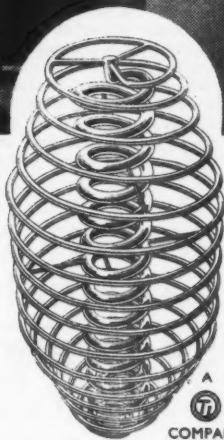


DIFFICULT MANIPULATION

The quality of the solid drawn steel or stainless steel tubing made by Talbot Stead enables them to carry out extremely intricate manipulations.

TALBOT STEAD

STAINLESS AND CARBON STEEL TUBES




COMPANY

TALBOT STEAD TUBE CO. LTD. • GREEN LANE • WALSALL

TBW.3B



Postal
Courses in

**★PRESS TOOL
DESIGN**

**★PRESS TOOL
DRAWING**

**★PRESS WORK
MACHINES**

& Auxiliary Mathematics Courses

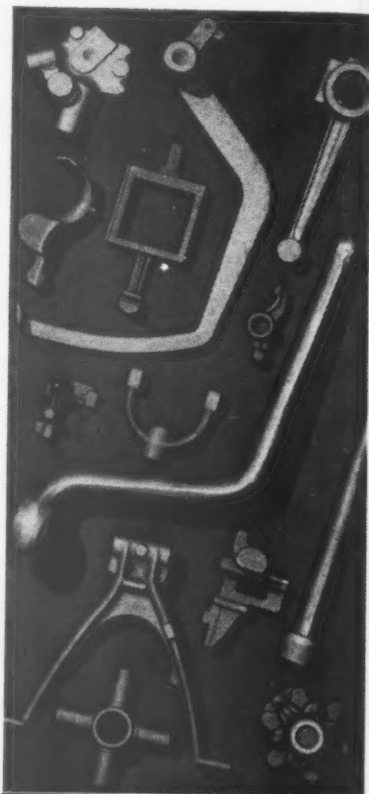
Improve your position in the works! Skilled men are valuable in industry, and the big jobs go to men with sound knowledge. Fit yourself for a better position in industry by postal study. This College gives much instruction not available elsewhere, in compact lessons from men of life experience. Tuition is **INDIVIDUAL**—*your* course is planned for you, and assistance given in your future career.

Send for Handbook P.E.—

VOCATIONAL TRAINING COLLEGE

*Craghill House, Thackley
Bradford, Yorkshire*

**PRINCIPAL—John W. Langton, M.B.E.,
B. Sc. (Eng) London, M.I. Mech. E., M.V.M.A., etc.**



DROP FORGINGS OF QUALITY
CLEAN AND ACCURATE
IN ALLOY AND CARBON STEELS

Made by

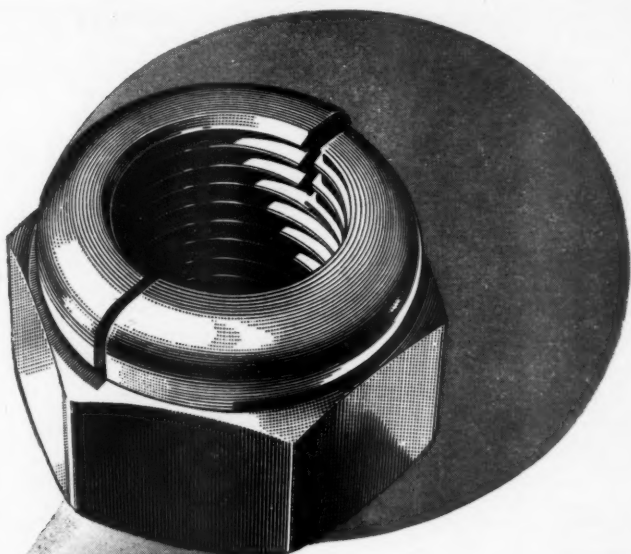
GEORGE MORGAN LTD.

SELLY OAK
BIRMINGHAM 29

Telegrams:
Midforge

Telephone:
SELLY Oak 1156
(4 lines)





*why call me a **STIFF** nut*

A Stiff Nut is a one piece nut which complies with R.A.E. Specification No. A.D. 114—a nut provided with means of increasing the friction between the thread of the nut and that of a standard bolt to an extent that the nut may be considered self-retaining. A Stiff Nut should be as light as is consistent with strength and be able to withstand all conditions of service use. It should be of a design which does not cause undue damage or excessive wear to the thread of the bolt on which it is mounted.

A perfect description, in fact, of the G.K.N. 'Aerotight' Nut—often casually referred to as a Lock Nut or Self-Locking Nut—which has the added advantage that it can be used over and over again without loss of efficiency. Its retentive properties are unaffected by oil, water or humidity.

G K N 'AEROTIGHT' STIFF NUT

Supplied in Steel, Stainless Steel, Light Alloy, Brass and Bronze in Whitworth, B.A. and B.S.F. Threads. Recommended for all applications where vibration is encountered. Economical in use. No need for drilled holes, cotter pins, lock washers, etc.

GUEST KEEN & NETTLEFOLDS (Midlands) Ltd. Screw Division, Box 24, Heath Street, Birmingham 18.

s/a/2002

INDEX TO ADVERTISEMENTS

| | Page | | Page |
|---|--------------------|--|---------|
| Abwood Tool & Engineering Co. Ltd. | LXV | Lancashire Dynamo & Crypto, Ltd. | — |
| Adam Machine Tool Co. Ltd. | LXI | Lang, John, & Sons, Ltd. | V |
| Ajax Machine Tool Co. Ltd. | XXXIX | Lloyd, Richard, Ltd. | — |
| Arcon, Tropical Products | — | Lund, John, Ltd. | LIV |
| Automatic Coil Winder and Electrical Equip- ment Co. Ltd. | XLV | | |
| Barber & Colman, Ltd. | XXXVIII | Mercer, Thos., Ltd. | LV |
| Benton & Stone, Ltd. | — | Mills, John & Co., (Llanidloes), Ltd. | — |
| Birlec, Ltd. | — | Mollart Engineering Co., Ltd. | — |
| Birmingham Aluminium Casting (1903) Co. Ltd. | iii | Monks & Crane, Ltd. | Li |
| Birmingham Pressure (E. Hartland) Die Casting The | XLV | Morgan, George, Ltd. | LXXI |
| Bratby & Hinchliffe, Ltd. | LXII | Motor Gear & Engineering Co., Ltd. | — |
| British Steel Founders' Association | — | McKechnie Bros. Ltd. | XXV |
| Brooke Tool Manufacturing Co. Ltd., The | XXXVI | | |
| Brooks & Walker Ltd. | LIX | Newall, A. P., & Co., Ltd. | vii |
| Broom & Wade Ltd. | — | Newall Group Sales Ltd. | XLII |
| Burton, Griffiths & Co. Ltd. | XXIV | Norton Grinding Wheel Co., Ltd. | — |
| | | | |
| Camerer Cuss | — | Osborn, Samuel & Co., Ltd. | — |
| Catmur Machine Tool Corporation, Ltd. | — | | |
| Central Tool & Equipment Co. Ltd. | — | Parkinson, J., & Son (Shipley) Ltd. | — |
| Chesterman, James & Co., Ltd. | — | Parsons Chain Co. Ltd. | xiii |
| Churchill, Charles & Co., Ltd. | XLIV | Pitman, Sir Isaac & Sons Ltd. | LVII |
| Churchill Machine Tool Co., Ltd., The | vi | Procter Bros. (Wireworks) Ltd. | LV |
| Cincinnati Milling Machines, Ltd. | XXX | Protolite, Ltd. | — |
| Climax Rock Drill and Engineering Works, Ltd. | XV | Pryor, Edward, & Son, Ltd. | — |
| Collis J. & Sons, Ltd. | Inside Front Cover | Pultra, Ltd. | LXIX |
| Conventry Gauge & Tool Co., Ltd. | XVII | | |
| Craven Bros. (Manchester) Ltd. | XXVI | Reavell & Co., Ltd. | LXVI |
| Crompton Parkinson, Ltd. | XLIII | Riley, Robert Ltd. | LXVII |
| | | Rockwell Machine Tool Co., Ltd. | XXIII |
| Dawson Bros., Ltd. | XXXIV | | |
| Dean, Smith & Grace, Ltd. | XXXIII | Sanderson Bros. & Newbould, Ltd. | LXI |
| Deloro Stellite Ltd. | XLVIII | Schrader's, (A) Son | XXXI |
| Donovan Electrical Co., Ltd. | — | Scrivenor, Arthur, Ltd. | LVI |
| Dowding & Doll, Ltd. | — | Sheffield Twist Drill & Steel Co. Ltd., The | — |
| Drummond Bros., Ltd. | XII | Smart & Brown, (Machine Tools), Ltd. | LIII |
| Duckham, Alexander & Co., Ltd. | XXIX | Sparklets Ltd. | — |
| | | Spencer, Franklin Ltd. | viii |
| Electro, Dynamic Construction Co., Ltd. | LIII | Spencer & Halshead Ltd. | XLVII |
| English Electric Co. Ltd., The | XXVIII | Steel Band Conveyor & Eng., Co., Ltd. | — |
| Exors. of James Mills, Ltd. | XXI | Sterling Metals Ltd. | — |
| | | Sunbeam Anti-Corrosives, Ltd. | XXVII |
| Fescol, Ltd. | ix | Swift, Geo., & Son, Ltd. | LX |
| Firth Thos. & John Brown Ltd. | XXXVII | Sykes, W. E. Ltd. | XIX, XX |
| Flame Hardeners Ltd. | LVII | | |
| Fletcher Miller Ltd. | XVI | Talbot-Stead Tube Co. Ltd. | LXXX |
| | | Taylor & Jones, Ltd. | — |
| Gill, Samuel & Sons (Engineers) Ltd. | — | Tecalemic Ltd. | — |
| Gledhill-Brook Time Recorders Ltd. | — | Technically Controlled Castings Group, The | LXIII |
| G.P.A. Tools & Gauges, Ltd. | XXXV | Towler Bros. (Patents) Ltd. | — |
| Guest, Keen & Nettlesolds (Midlands, Ltd) | LXXII | Tyne Truck & Trolley Co. Ltd. | — |
| Guylee, Frank, & Son, Ltd. | Inside Back Cover | | |
| | | Unbrako Socket Screw Co., Ltd. | xiv |
| Hall, Matthew & Co., Ltd. | — | Universal Tools, Ltd. | LXXIX |
| Harrison, T. S., & Sons, Ltd. | XL | | |
| Havelock Engineering, Co., Ltd. | — | Van Moppes & Sons (Diamond Tools) Ltd. | XXVII |
| High Speed Service Tool Co., Ltd. | LXV | Vaughan, Edgar, & Co. Ltd. | — |
| Herbert, Alfred, Ltd. | E | Vaughan, Crane Co. Ltd. | LXX |
| Hilger & Watts, Ltd. | XLVI | Vickers-Armstrongs Ltd. | LXIV |
| Holman Bros. Ltd. | Back Cover | Vocational Training College | LXXI |
| Hoover, Ltd. | XXII | | |
| Hordern, Mason & Edwards, Ltd. | XXXII | Ward, H. W., & Co., Ltd. | iv |
| Hoyt Metal Co. of Great Britain Ltd. | — | Ward, Thos. W., Ltd. | LVIII |
| | | Wickman, A. G., Ltd. | X, XI |
| Imperial Smelting Corporation (Sales), Ltd. | LII | Williams & James (Engineers) Ltd. | — |
| | | Wild Barfield Electric Furnaces Ltd. | LXIII |
| Johansson, C. E., Ltd. | LXVIII | Wolverhampton Die Casting Co., Ltd. | XLI |
| | | | |
| King, Geo. W., Ltd. | — | Young, John S. & Co., Ltd. | — |
| | | | |
| | | Zinc Alloy Die Casters Association | XLIX |

Page

v

—

liv

lv

—

li

lxxxi

—

xxv

vii

xlii

—

—

—

xiii

lvii

lv

—

—

lxxix

—

lxxvi

xxvii

cxiii

—

lxi

cxvi

lvi

—

liii

—

viii

lvii

—

—

xviii

lx

xx

—

lxx

—

—

xiii

—

—

xiv

xxix

—

—

xvii

—

lxx

xxv

cxvi

—

—

iv

viii

xi

—

—

—

—

'ARCHER' SLEEVES & SOCKETS

Specialised Production.

PRODUCED IN TWO QUALITIES.

ARCHER SUPER QUALITY Sleeves and Sockets are hardened all over; ground internally and externally, and are of exceptionally high quality. They have a long life of accuracy and concentricity.



THESE SUPER SLEEVES being hardened, prevents bruises and burrs from rough shop usage, and thereby protects machine spindle bores from damage. The extra cost of these hardened high-grade Sleeves and Sockets is very soon paid for by the savings effected.

ARCHER STANDARD QUALITY Sleeves and Sockets meet the demand for a high class sleeve at a moderate cost. Both the internal and external taper are guaranteed to standard Morse gauges. The tangs and slots are correct in dimensions and centralised, thereby avoiding tang binding and broken tangs.

THESE STANDARD Sleeves and Sockets are toughened by oil-heat treatment, and stand up to shop usage much better than the cheaper soft sleeves.

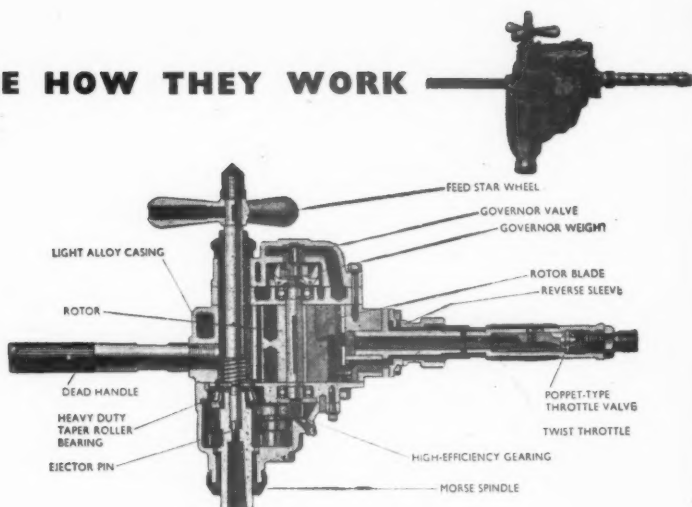


BUY BRITISH SLEEVES — ASK FOR LIST 45

FRANK GUYLEE & SON

'ARCHER' TOOL WORKS. *Ltd.*
MILLHOUSES · SHEFFIELD.8

SEE HOW THEY WORK



See, too, how *smoothly* Holman Rotodrills run—and for how long without attention. For deep holes or sheet metal work, for woodboring, for tapping and flue-rolling, for drilling and reaming in awkward corners—there's a Holman Rotodrill for practically every job a drill will do and for some that other drills won't do. The vane-type air motor keeps up a *constant* speed, ensuring clean, fast drilling. Stall a Holman Rotodrill and you can restart it at once. No vibration—low air consumption.

DELIVERY EX-STOCK



ROTOGRINDS.
Smooth-running and quiet. Full range of precision grinding and heavy-duty types for internal grinding, cleaning castings, polishing, buffing, scaling, fettling, etc. "Straight" and "grip" handles supplied.

CHIPPING HAMMERS
for all classes of work. New designs with easy but precise control. No vibration, no maintenance, no trouble.



H.A.2

SAMPLE RANGE

| Type | R.P.M. | Capacity ins. | Length ins. | Weight lb. |
|--------------|--------|---------------|------------------|------------------|
| Handheld O/S | 2,400 | $\frac{1}{8}$ | 8 $\frac{1}{2}$ | 5 $\frac{1}{2}$ |
| 28 | 1,200 | $\frac{1}{8}$ | 15 $\frac{1}{2}$ | 11 $\frac{1}{2}$ |

SCREWFEED REVERSIBLE AND NON-REVERSIBLE

| | | | | |
|-----------------|-----|-----------------|------------------|------------------|
| 310 R | 700 | $\frac{1}{8}$ | 11 | 16 $\frac{1}{2}$ |
| 420 R | 350 | 1 $\frac{1}{2}$ | 13 $\frac{1}{2}$ | 34 |
| 870 R | 45 | 3 | 20 | 59 |
| Close Quarter | 400 | 1 $\frac{1}{2}$ | 22 | 35 |
| Woodbore 312 RW | 520 | 1 $\frac{1}{2}$ | 13 $\frac{1}{2}$ | 17 |

NOW is the time to send for details and specifications of the complete range. Please state if interested in other pneumatic tools.

*The first name
for lasting service*

BROS. LTD.
Holman
CAMBORNE, ENGLAND
TELEPHONE: CAMBORNE 2275 (7 LINES)
TELEGRAMS: AIRDRILL, CAMBORNE
SUBSIDIARY COMPANIES, BRANCHES & AGENCIES THROUGHOUT THE WORLD

All communications regarding advertisements should be addressed to the Advertising Managers, T. G. Scott & Son, Ltd., Talbot House, 9, Arundel Street, London, W.C.2. Phone: Temple Bar 1942. Printed by Maxwell, Love & Co., Ltd., Bradley's Buildings, White Lion Street, London, N.1.

Weight
lb.

5½

11½

VISIBLE

16½

34

59

35

17

cations
ected in

ce

o.

n

ND

(VES)

RNE

S &

RLD

ers.

942.

N.1.